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CONTENTS

DIESEL RAILWAY TRACTION

A Supplement illustrating and describing developments in Diesel Railway Traction is presented with every copy of this week's issue

1888–1938

THOUGH comparisons may be odious, they can, nevertheless, prove of very great interest, and may indeed bring to mind the equally trite saying that "circumstances alter cases." The demonstration Flying Scotsman runs arranged by the L.N.E.R. on June 30 (see page 77) provided an opportunity of gauging at first hand the differences that a period of 50 years has brought about in locomotive and rolling stock design and construction. The "period" train made up of rolling stock of the type used in the E.C.J.S. Anglo-Scottish services of 1888, was hauled by the Stirling 8-ft. single-driver locomotive No. 1, built at Doncaster in 1870; and the other train, comprising the latest Flying Scotsman rolling stock just out of the same works, was hauled by one of the latest 4-6-2 streamlined express engines, No. 4498, *Sir Nigel Gresley*. Inspection of the two trains whilst stationary sufficed to demonstrate the tremendous advance in general style and appointments, but an even more striking comparison was made possible by the facilities afforded to the company's guests who travelled from King's Cross to Stevenage in the 1888 train comprised of seven six-wheeled coaches, and afterwards on to Barkston junction and back to King's Cross in the new Flying Scotsman made up of the new stock which went into service on July 4. The idea of celebrating the jubilee of the Railway Race to Edinburgh in 1888, and at the same time giving their guests an opportunity of comparing the two trains, was admirably conceived and as admirably carried out by the L.N.E.R. Company and the officers principally concerned.

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Road and Rail—a Contrast

Our editorial remarks last week on the doubtful pleasures of owning a car in these times of ever-increasing traffic congestion on the roads, but also of ever-increasing comfort and speed in rail travel, are particularly well illustrated by two cuttings, sent by a correspondent, which appeared on the same day this week in the *Daily Mail*. In one, this paper's own Motoring Correspondent announced ironically that he had recently covered that 52 miles of road between Brighton and London in the "extraordinary time of 3½ hours." Twenty years ago, he pointed out, he did the same journey in the same time—but on a bicycle. Extraordinary in the true sense of the word, however, was the news in the second cutting, which recorded the feat of the L.N.E.R. streamlined locomotive *Mallard* in attaining the speed of 125 m.p.h. The possibility that many who have become accustomed to making long journeys by road are now entirely ignorant of what the railways provide in the way of speed, comfort, and safety in these progressive days, is pointed out by our correspondent in mentioning the experience of a motoring friend who recently travelled to Scotland by night express for the first time in twenty years, and returned so enthusiastic about the comfort of sleeping car travel, both on the L.M.S.R. and L.N.E.R., that he expressed the intention of never again undertaking any long journey by road.

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The Week's Traffics

For the first 26 weeks of this year the receipts of the four group railways have amounted to £76,758,000, a decrease of £1,841,000 or 2·34 per cent. in comparison with the figures for the corresponding period of 1937. The decrease for the past week is £231,000, against £207,000 for the previous week. For the year to date the contributions to the total receipts of the four companies are:—£32,848,000 from passenger train traffic, a decrease of £184,000 net, the L.M.S.R. having an increase of £12,000; £27,090,000 from merchandise, a decrease of £1,250,500; and £16,820,000 from coal.

	26th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R.	+ 11,000	– 75,000	– 14,000	– 78,000	– 780,000	– 2·45
L.N.E.R.	– 17,000	– 60,000	– 26,000	– 103,000	– 638,000	– 2·73
G.W.R.	– 8,000	– 24,000	– 9,000	– 41,000	– 318,000	– 2·42
S.R.	– 6,000	– 2,000	– 1,000	– 9,000	– 105,000	– 1·02

Irish railways show the following results for the 26 weeks:—Belfast & County Down £63,587, a decrease of £4,702; Great Northern, £466,300, a decrease of £20,500; and Great Southern £1,836,329, a decrease of £56,562.

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Midi Railway Company

The joint working arrangements between the Paris-Orleans and the Midi Railway Companies have been in operation from the beginning of 1934, and the reports of the two companies have not, since then, distinguished the items making up the joint receipts and expenses, but have given the estimated totals for each company. For the Midi Company these separate totals for 1937 and 1936 are compared below:—

	1937	1936
	Fr.	Fr.
Gross receipts	799,787,884	685,930,217
Expenses, net	919,008,493	715,939,111
Loss on working	119,220,609	30,008,894

After allowing for capital and other charges the total deficit for the year 1937 was fr. 456,192,185, which added

to special intercalated charges of fr. 31,636,720, makes fr. 487,828,905 the total amount to be claimed by the company from the Common Fund for 1937, against fr. 376,209,243 for 1936. The dividend is unchanged at fr. 50, and the length of line in operation remains at 4,290 km. Electric operation is in force on 1,863 km., or 45 per cent. of the whole Midi system, and further developments in this direction in the past two years have been on the P.-O. lines of the jointly-worked undertaking. Receipts on the joint system in 1937 amounted to fr. 2,394,118,299 and expenses to fr. 2,601,141,538, resulting in a loss on working of fr. 207,023,239.

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Publicity: Advertising: Propaganda

The incidence of transport on the conditions of life, and its bearing upon our habits need no stressing. Of the total number " gainfully employed " in Great Britain about one in seven is in one branch or another of the transport services, and this figure ignores thousands engaged in ancillary trades. The services run by this army of workers, on water, on land, and in the air, are a matter of private or business concern to all, and it is to their interest to keep us informed about what they are doing and how they can best serve us. To this end they must advertise, particularly those who possess no monopoly and therefore have to compete with rivals for custom. Their appeals to the public take many forms—which, in a recent paper to the Manchester-Liverpool & District Section of the Institute of Transport, Mr. K. Russell Brady shortly and arbitrarily described as follow: " Publicity, a simple tale; Advertising, an embroidered tale; and Propaganda, a tale with a twist, often a romantic twist—although this same tale may be barbed in the familiar satanic mode." Early transport announcements were simple statements—the predecessors of the modern timetable. When superior speed and comfort is a consideration and is invested with glamour by means of a high-sounding description or a fancy name, it becomes what Mr. Brady defines as advertising. But when we are asked to travel up or down the east or west side of England because it is sunnier or drier or has more castles or cathedrals, we are the object of propaganda.

* * * *

Buenos Ayres & Pacific Moratorium

After the statement by Mr. J. A. Goudge at the meeting last week of the 4½ per cent. consolidated debenture stockholders of the Buenos Ayres & Pacific Railway Company there was little doubt that the scheme of arrangement for an extension of the moratorium of interest on this and other stocks affected would be approved by substantial majorities. Interest totalling £185,000 on the first debenture stocks of the Pacific and Argentine Great Western Railway Companies has been regularly paid and has not been affected by the moratorium which was first sanctioned in 1932. For a time the interest, requiring £161,375, on the second debenture stocks of the two companies, was subject to the moratorium, but by June 30, 1936, all arrears on these stocks and interest on such arrears had been cleared, and as interest on these stocks has since been regularly paid, the moratorium extension now approved until 1941 at latest does not apply to them. Interest requirements on the Pacific 4½ per cent. debenture stock are £357,420 and on the Argentine Great Western 5 per cent. debenture stock are £272,600. With the half-year's payments which are to be made on July 28 next, all arrears up to July 1, 1934, on the Pacific stock and up to October 1, 1934, on the Argentine Great Western stock have been cleared off. The remaining stocks still subject to the moratorium are the Pacific 5 per cent. (1912) debenture stock, with interest requirements of £250,000, and the Argentine Great Western 6 per cent. guaranteed preference stock, on which the dividend requirements are £210,000.

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Argentine Railway Position

The immediate prospects of the Buenos Ayres & Pacific as well as those of most other British-owned Argentine railway companies are not particularly bright owing to the poor wheat and maize crops, which have been causing heavy decreases in traffic during the financial year just ended, and are likely to prolong them for some five months of the new financial year. Net revenue of the Pacific Company for the year ended June 30 last, after allowing for operating expenses and exchange differences, is estimated at £905,000, as compared with £1,120,513 actual for 1936-37. Mr. Goudge, however, at the above-mentioned meeting, pointed out that compared with six years ago the property of the Pacific Company now stood unencumbered with debt and, but for accrued debenture charges, in a better financial position. Exchange was no doubt the crux of the problem, but exchange devaluation was a general measure forced on Governments. The special hardships of the railways had been recognised by the Argentine Government and met by a special rate which had in effect been continued ever since. It was a relief, and an earnest of goodwill. The Argentine Government had always treated and would continue to treat the British railways there with every consideration, having due regard to Argentine vital interests.

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The Netherlands Railways

The railways in Holland, according to an article by Mr. S. A. Reitsma in the *Financial and Economic Review of the Amsterdamsche Bank*, have always been a much fettered industry. Regulation was tried as early as 1890, beginning with the expropriation of one of the competing railway interests, and the formation of a company to work the State Railways. In 1926 regulations were first introduced controlling the transport of passengers by road, but nothing has been done to regulate the conveyance of goods, although some restrictions were placed on canal traffic in 1933. The financial situation of the railways grew worse, and the State was called upon to make good deficits which every year became more serious, until in 1936 a company was formed with the State as sole shareholder, to operate, under the title of Nederlandsche Spoorwegen, the whole of the railway system (see THE RAILWAY GAZETTE of September 3, 1937). At the beginning of 1938, when the new company assumed control, the length of line in working was 2,420 km. of main and 785 km. of local line. Measures of co-ordination are being considered with a view to controlling road traffic, and in this way, with retrenchments already effected, it is believed that the railway system may now become self-supporting.

* * * *

Canal and Road Competition

With 80 per cent. of the goods traffic carried on the canals and an entirely uncontrolled road merchandise service, it is not surprising that the Dutch railways should be unable to cover their expenses. A comparison of some of the operating figures is eloquent. In 1930 59 million passengers were carried with 85·3 million florins revenue. In 1936 the figures had fallen to 44·5 million passengers for 51 million florins. Similarly, goods traffic decreased from 22·6 million tons and 79 million florins in 1930, to 13·9 million tons and 42 million florins in 1936. Retrenchments have been made in many directions. Between 1924 and 1937 services were completely suspended over 410 km. of line, and partly so over 294 km. The number of stations, which was 860 in 1926, has been reduced to

560 in 1937 and will be further reduced to 410 in 1938. The abolition of crossing keepers at crossings of small traffic and good visibility saved over two million florins. In this way operating costs were reduced from 194 million florins in 1921 to 92 millions in 1936. But revenue unfortunately continued to decline, in spite of improved service, modern methods, and reductions in rates, falling from 194 million florins in 1921 to 95·5 millions in 1936. The 1937 figures make a slightly better showing but the effects of the reconstruction resulting from the Act of May 26, 1937, will be felt only in 1938.

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Spain Self-Sufficing

Only a few years ago the report of large orders for railway materials for Spain would have meant the possibility of increased business for manufacturers in this country. Since the European war, however, there has been a change, and most of the fine types of locomotives, both steam and electric, which have been the means of so improving rail transport in the Peninsula, were built locally and largely with local labour and materials. In this great step towards national self-sufficiency an important part was played by British interests, which with admirable foresight formed subsidiary companies and established their workshops in the country. These companies will now participate in the revival that may confidently be expected to occur in industry after the end of the civil war, and of which the railway programme of the Burgos Government would appear to be an early indication. In this connection we were interested to hear, from a business man who has recently toured through Nationalist Spain, of the evidences of prosperity and activity apparent on every side. Very promising also is the report, from workshops engaged in the construction of railway equipment, that the shortage of labour, inevitable in war time, is partly compensated by a marked improvement in the rate of individual output as compared with the pre-war period.

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New Tail Signals in the Netherlands

On March 7 of this year the Netherlands Railways brought into force amended signal aspect regulations, a feature of which is the abolition of the lower, or ordinary, train tail lamp or disc, leaving only the upper or side lamps or discs, which are placed on the tops of the vehicles so as to be seen forwards. The usual night tail signal thus used to be formed of three red lights in a triangle, so long common in this country until the abolition of side lights on passenger trains. The side lanterns in the Netherlands formerly showed green lights forwards, but white has now been substituted to avoid confusion with signal lights. A special train is indicated by making the rearwards indication of one side tail disc or light white, and the preceding ordinary train has one of them altered to yellow. When a special train has to announce another one the tail signals are a white disc or light and a yellow disc or light, presenting the peculiarity of a tail signal aspect without red in it. On the diesel and electric trains, in which the side lights are built into the vehicle, no indication is given in the forward direction.

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The Metric System

The President of the L.M.S.R. at the last annual general meeting, announced that in conjunction with the other railway companies and with the consent of the Minister of Transport, they had omitted shillings and pence from the full published accounts. More recently, a leading business firm published its accounts with the figures shown in the decimal notation, and at the general meeting the chairman said they had made this change because the board was convinced that the adoption of a decimal coinage would be of real value to business and to the country generally. Without entering here into the many arguments for and against the adoption of the metric system, we cannot but record the two announcements we have mentioned as of importance in this connection. It is true that the omission of shillings and pence in the published accounts of the railway companies does not at first glance appear to portend any radical change, but it certainly is a step towards a simplification. Surely for the railways, with their infinite number of small transactions, the facility afforded by the metric system would be most valuable. If the initiative in this matter is to come from private enterprise it may be that we have now the first signs of the coming reform. On the other hand, the increasing complication of monetary accountancy, due mainly to its failure to reflect physical facts truly, is at the root of the wish for a reform that should not be necessary.

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Selective Telegraphs and Telephones

Not long after the electric telegraph became a successful commercial enterprise, inventors turned their attention to the possibility of reducing line costs by making a single line circuit serve to convey more than one message at a time. Similarly, when the telephone came into use it was soon found desirable for call bells to be rung selectively, leaving other instruments not concerned, but on the same circuit, silent. The railways, as large users of telegraphs and telephones, have been interested in these problems from their own point of view, which differs somewhat from the conditions governing general telegraph and telephone networks. The development of printing telegraphs, carrier wave transmission, and automatic exchange and switching systems, not to mention train describers, signal post telephones, and so on, has much extended the scope for application of selective principles. For this reason Mr. R. P. Quelch's paper before the Institution of Railway Signal Engineers at Birmingham on April 27, in which he reviewed certain methods and their characteristics, is of special interest to those concerned with improving railway communicating apparatus, of whatever kind.

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An Instructional Locomotive

At the works of W. G. Bagnall Limited, of Stafford, an interesting tank engine of the 0-6-2 type was recently completed to the design of the maker and built to the requirements of the Royal Engineers' Training Centre at Longmoor Camp in Hampshire. It carries with it a number of fittings which, although not essential in such a locomotive, are important for instructional purposes as providing those who handle it on the Longmoor Military Railway with experience that will serve a useful purpose in the event of their having to work engines of different types and equipment elsewhere. The locomotive is described on pages 58-63 of this issue, and by the courtesy of Colonel D. J. McMullen, of Longmoor Camp, and of the builder, we are also able to publish illustrations and drawings. The only point associated with the design which occasioned us surprise when we inspected the locomotive at the Castle engine works, Stafford, just prior to its dispatch, was the absence of superheating equipment. It is true, of course, that the service conditions are not such as to render superheating specially advantageous, there being nothing in the way of continuous running to be performed. Its inclusion might, however, be thought justifiable on instructional grounds, as in the case of the other fittings, whilst if the same line of thought be followed, screw, or even power, reversing gear might have had greater value than the lever and rack type adopted.

Two Miles a Minute

IT is probably to the sporting instincts of the average man that a "record" has the most stimulating appeal. Even railways are not entirely immune from rivalry in these matters, as past history proves, and it is therefore no more than fitting that warm congratulations should be extended to the London & North Eastern Railway, to Sir Nigel Gresley, designer of the locomotive *Mallard*, and to Driver Duddington and Fireman Bray for the magnificent performance that was put up on Sunday last. From the more coldly scientific point of view, it is satisfactory that so decisive and unquestioned a lead has been established as one which is a clear 11 m.p.h. higher than any previous record claimed on British metals. It is also of great interest that this sustained average speed of 120 m.p.h. for 5 miles, with its maximum rate of 125 m.p.h., was reached on the first really high speed trial of a locomotive fitted with the Kylchap blast arrangements and double chimney. From the remarkable steadiness of the speed in this high range, which is best appreciated by a study of the diagram on p. 79, it is clear both that the boiler was able to find steam with ample rapidity to meet the heavy demand of a wide open regulator and 40 per cent. cut-off at over 500 r.p.m. of the driving wheels, and that the engine was equally able to exhaust its used steam without difficulty at this speed.

It is also of interest to recall that the record of 125 m.p.h. thus achieved by *Mallard* on Sunday last equals the best previous world record with steam, which was that made by one of the German streamlined 4-6-4 locomotives on a test run between Berlin and Hamburg. German designers for years past have insisted on a free exhaust, with large blast-pipes and chimneys, as a secret of successful performance. But whereas these German locomotives have been designed expressly for super-speed work, with 7 ft. 6 in. driving wheels as against the 6 ft. 8 in. wheels of the British locomotive, the credit of the latter's performance is enhanced by the fact that it belongs to a more "general purpose" class of locomotive, as much at home on heavy load duties as in the development of sustained high speed with the streamlined trains. In this connection it is, perhaps, unfortunate that the cautious attitude of the French towards high speeds with steam has forbidden any attempt to discover what is the maximum speed of the Chapelon Pacifics in similar conditions. As to other records, some of which have been quoted in this connection, and in particular a supposed American record of 127 m.p.h. as far back as 1905, these have so little support of detailed figures that it is impossible to regard them as having adequate authentication. It is only during the past decade or so, and largely as a result of the high standard of accuracy in the record of locomotive performance set by the "British Locomotive Practice and Performance" articles in our associated journal, *The Railway Magazine*, that the need has become established for something more than the casual glance at a watch now and again, and a time to the nearest minute which presently is used to work out a speed in miles per hour and several places of decimals, to establish what can be accepted as a record. It would, indeed, assist our appreciation of the German 125 m.p.h. to which we have referred if we could be informed as to the conditions in which it was made, for how long it was sustained, and, indeed, all the details of passing times and adjacent speeds that provide the necessary support for a record speed claim.

The striking increase of maximum railway speeds in Great Britain in a very short period of time speaks well for the greatly increased efficiency of the latest locomotive design. Until the year 1934 a speed in three figures was practically unknown in this country; in May, 1904, there was certainly the reputed 102·3 m.p.h. of the locomotive *City of Bath*, but critical investigation many years later of the inadequate and somewhat contradictory data that had been set on record left it in some doubt as to whether quite so high a speed had, in fact, been reached. Then, in November, 1934, came the 100 m.p.h. on a test run of the L.N.E.R. "A1" Pacific *Flying Scotsman*, followed, in rapid succession, by the 108 m.p.h. of *Papyrus*, an "A3" Pacific, in March, 1935; the double 112½ m.p.h. of *Silver Link* on the Silver Jubilee trial of September 27, 1935, forming part of 43 miles at an average rate of 100 m.p.h.—still, probably, a world's record for sustained three-figure speed with steam—the 114 m.p.h. of the L.M.S.R. *Coronation* on June 29, 1937, and the 109 m.p.h. of the L.N.E.R. *Dominion of Canada* on the following day; and now the 125 m.p.h. of *Mallard* on July 3, 1938—a rise of 25 per cent. in speed in less than four years. And the day has come when on a number of occasions the L.N.E.R. streamlined trains have reached or slightly exceeded 100 m.p.h. in the course of ordinary running when circumstances have rendered such speeds desirable in the interests of timekeeping, though in the ordinary course the prescribed limit of 90 m.p.h. amply suffices to maintain the schedules. The L.N.E.R. has thus taken a large share in restoring Great Britain to a leading position in the world of railway speed, and it is significant that this restoration has been carried through with continued reliance upon steam and our own native coal.

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The P.W.I. in Germany

FOR many who participated in the summer convention of the Permanent Way Institution in Germany last week it was their first visit to that country, and we were naturally interested to hear expressions of opinion from these at the end of an eventful week. On all sides it was admitted that the keynotes of the trip were the unvarying courtesy and hospitality of the German hosts and the high standard of technical efficiency of the Reichsbahn. To those familiar with Germany over a long period of years, their experiences of this recent visit merely tended to strengthen similar views which they had formed on previous occasions. As both Dr. Dorpmüller and Dr. Remy said, nothing but good can result from the mental co-operation of two great peoples, and the hope was expressed on all sides that the visitors would leave Germany convinced of the desire of the whole country for peaceful progress. That progress in many directions has been and is being achieved, there was abundant evidence on all sides; and the extent and variety of the excursions planned for the visitors by the Reichsbahn gave opportunities for viewing many aspects of modern German life in large town, small town, and agricultural region, and on railway, *Reichsautobahn*, and minor road. There was doubtless very considerable thought underlying the attractive programme prepared for the visitors, with the object of securing not only their pleasure but also the maximum of technical interest presented in the most satisfactory sequence. Thus, to begin with, attention was paid chiefly to excursions which would result in familiarity with Western Germany, and in functions which afforded opportunities for making personal friendships between the British visitors and their German hosts. Then the programme broadened to cover many phases of railway operating conditions and the latest civil engineering practice, and thus the ground was suitably prepared for a brief but intensive study of current permanent way methods under actual everyday conditions as a conclusion. A different order of events would almost certainly have proved less helpful, for, apart from the obvious value

in having a general idea of conditions before proceeding to specialisation, there was the particular merit that lengthy train riding in the earlier part of the week had proved the efficiency of the permanent way before the concluding demonstration of "how it was done." Thus any doubts as to the efficiency of methods which, in certain respects, differ fundamentally from those obtaining in Great Britain, were dispelled in advance in much the same way that the conjuror who produces a rabbit out of his hat and can show that it is undoubtedly a genuine rabbit is in a far stronger position to convince his audience (should he be pleased to show his method) than would be an instructor in conjuring who specified some apparently simple manual movements and then declared that, were these performed in quick succession, an audience would be entertained.

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Lancashires Transport Problems

A CONFERENCE on transport in Lancashire took place on Tuesday last in Manchester, at which some 350 delegates attended on behalf of commercial and trade organisations, county and local government authorities, town planning committees, and transport undertakings in the Lancashire area. It was organised by the Lancashire Chambers of Commerce Committee and the Lancashire Industrial Development Council. Discussion centred on papers presented by Mr. Ashton Davies on "Railways and the Lancashire of Tomorrow," by Major H. E. Hickmott on "The Development and Future of Lancashire's Road Passenger Transport," by Mr. R. Stuart Pilcher on "Municipal Transport in Lancashire," and by Mr. C. Le M. Gosselin on "Moving Merchandise by Road in Lancashire." Later papers were presented by County Alderman P. Macdonald on "Old and New Roads in Lancashire," and by Mr. J. Bennett Storey on "Transport and Industrial Development in Lancashire." Every side of the transport question in Lancashire was, therefore, fully covered. Mr. Ashton Davies at the outset claimed that no part of Great Britain was better served by transport in its various forms than was Lancashire. For the most part the immediate problem before the Conference was, he suggested, one of adjustment and improvement in quality rather than one of provision of additional services and facilities. One of the matters worthy of examination was the possibility of establishing some machinery whereby by mutual agreement between the transport interests concerned and the local authorities whose areas were affected, the capital expended on providing additional necessary transport facilities should have adequate protection. If a new approach was to be made in examining the existing and potential transport resources of Lancashire, the objectives should be sought on the following lines:—

1.—To improve and develop the existing means of transport for passengers and merchandise so as to afford the freest possible movement from point to point at the lowest economic charge.

2.—Within the bounds of national considerations, local influences should be directed towards maximum employment of the various forms of transport in such manner and relationship as to be most advantageous to the community as opposed to conferring advantages upon individuals or sections of the community. Wasteful competition should not be permitted.

3.—There should be maximum utilisation of existing capital resources where such are suitable to present-day needs, and expenditure on public works associated with transport should be rigidly controlled by the test of their absolute necessity in the public interest.

One of the great changes in the industrial structure of Lancashire was the decline in the cotton industry and in coal production. This decline had created an urge to secure at least a compensatory importation of other industries. In place of the large amount of local transport used by the cotton industry, the transport agencies would be increasingly called upon to distribute a greater volume of Lancashire's products over the whole area of this country. The railways were fully capable of meeting all requirements in this respect. Something could be done to improve purely local services and facilities provided this did not conflict with national considerations. In the central area of Manchester the speed of street traffic tended to become slower and slower as the number of vehicles using the streets increased. The way to improvement would seem to be a choice of one of two policies, namely: (i) To reduce the congestion by the provision of extensive vehicle parks, and the carrying out of appreciable street widening; or (ii) the elimination of traffic from existing streets by the provision of tube railways. To adopt the first course would be very costly and merely a palliative. Underground railways would be the more satisfactory way of tackling the problem provided it was associated with a scheme of complete co-ordination of the whole of the transport facilities in the area concerned.

Regarding the movement of freight traffic, it should be recognised that the needs of the nation must come first; next should come communities of industry in which the basic trades must take precedence; and thirdly in catering for individual or particular localities the services and facilities afforded should be provided with careful regard to the wider interests of the two greater communities of interest already mentioned. The system of railway rates for merchandise traffic was not only scientifically sound as a transport tariff, but it combined stability with flexibility. By its means traders located at considerable distances from given markets were assisted to obtain trade by means of exceptional rates. There were certain low grade commodities passing from Lancashire to the south of England at rates which were only possible by rail transport, and without which the production and trade in question would be impossible. Railway rates were sometimes criticised as being too high, but for the year 1936 the average receipt per ton was 6/5 only for an average haul of 58½ miles. Railway facilities in Lancashire were not being utilised to anything like their full capacity. By the use of motor vehicles for collection and delivery purposes the railways were able to concentrate the miscellaneous traffic of a relatively wide area through one of the main terminals in that area, thus expediting transit. This ideal co-ordination of rail and road transport now being developed would reduce to a minimum any disability for factories or new works which might in the future be established in country localities or outer suburban areas. A good example was the Wythenshawe Estate, upon which a number of factories for light industries had been erected insufficiently close to the railway to permit of sidings being laid in. Motor vehicles were being used to link up the estate with the Manchester main goods stations, and the traders at Wythenshawe were thus placed on an equality with those established in the inner parts of the Manchester area.

On the subject of rail and road co-ordination Mr. Ashton Davies said that the extreme disintegration of the goods road transport ownerships was in marked contrast with the closely welded proprietorship of the passenger services. Goods services were not licensed as to the routes over which they might ply, and as yet, any carrier of goods by road might charge what he thought fit, whether it was economic or not. Even if conditions of operation and rates for road transport were placed on a more satisfactory basis, he was unable to see how it would be possible to establish any tangible co-ordination of the rail and road services, either in Lancashire or elsewhere. The continuance of a position whereby road rates would be based on the cost of

operation whilst railway rates would, as far as possible, recognise the wider implications of an *ad valorem* system of charging, made competition inevitable and co-ordination virtually impracticable. In conclusion he would welcome the establishment of some kind of county forum where at suitable intervals progress made towards the goal of a planned transport structure in Lancashire could be recorded and further encouraged by constructive criticism and discussion. The Transport Advisory Council had recognised that until the goods road transport industry secured a measure of control over the rates charged, the general question of co-ordination with other forms of transport could not be proceeded with. Legislation bearing upon certain aspects of the road transport problem was already taking shape.

Major H. E. Hickmott, Managing Director of Ribble Motor Services Limited, dealing with the effects on road passenger transport of the Road Traffic Acts from 1930 to 1937, said that a general stabilisation of services and fares had resulted since the Act of 1930 came into operation, and in the main co-ordination between the various road operators and the minimising of wasteful running had been made possible and accomplished with advantages to the public and to the operators concerned. The existing system whereby municipalities dealt with internal local traffic and companies with semi-local traffic, *i.e.*, traffic from intermediate places to the towns, and town-to-town traffic, was not capable of much, if any, general all-round improvement. Under this arrangement local passengers did not crowd out the through passengers nor slow down the through services. He suggested that with stops at the relatively unimportant village railway stations abandoned, town-to-town travel by rail could be given a new meaning and 40 m.p.h. journeys become the rule rather than the exception. Mr. R. Stuart Pilcher, General Manager, Manchester Corporation Transport Department, gave some interesting particulars as to the extent of municipal transport in Lancashire, which comprises 33 per cent. of the whole of the municipal road passenger transport undertakings in the provinces. He also reviewed the changes caused by tramway abandonments, resulting in the reduction to twelve of the number of tramway systems in the county. Mr. C. le M. Gosselin, dealing with the movement of merchandise by road, said the weakness of the licensing system was that it endeavoured to rationalise road transport in relation to all other forms of transport—the latter not being subjected to rationalisation themselves Traders accepted the regulation of road transport in the interests of public safety, but found it more difficult to accept with the same degree of enthusiasm the principle of setting up a rates structure for the industry. Traders operated today under C licences rather more than two vehicles for every vehicle operated by a road haulier. A practical approach to a road rates structure might be made by giving statutory force to the more effective voluntary rates agreements already in existence.

In opening the Transport Conference, the Chairman, Mr. J. Thwaites, welcomed the delegates, and pointed out that if industrialists and commercial men wished to enjoy the benefits of progress in transport facilities, they must take an active and, indeed, an aggressive interest in transport problems. They must co-operate intelligently with the various transport agencies; they must support a sound policy both nationally and locally in transport regulation, and oppose vigorously any proposals or policies which were unsound; they must formulate their needs and make their demands vocal, because in transport supply would be forthcoming if the consumer demonstrated that the demand existed. In the course of the discussion on the papers read quite an interesting controversy took place regarding the merits of road versus railway transport, but the great feature of the occasion was the very friendly atmosphere among those connected with every type of transport. In the result a resolution was carried on Tuesday authorising the convening committees to establish forthwith a Standing Committee on Transport in Lancashire. Before the discussion a luncheon was given at the Midland Hotel, Manchester, to the delegates by the board of directors of the Manchester Chamber of Commerce. The principal guests were Dr. Leslie Burgin, Minister of Transport, and Lord Stamp. The Minister said that in his journey thither by air, the pilot took a line which showed scant respect for county or other boundaries, and that, he suggested, was a strong hint to the conference. Lord Stamp, in dealing with Lancashire's transport problem, laid stress on the importance of an economic return as an incentive to change and on the importance of not excluding any existing service in a co-ordinated scheme. Not one could be excluded without overloading the rest.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

The Castlecary Collision

7, Victoria Street, London, S.W.1
June 30

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Referring to your editorial on the Castlecary Accident Report; I would like to offer a comment on Col. Mount's remarks in connection with couplers and vestibules as preventives of telescoping. While I agree fully with the Inspecting Officer's remarks, I have to suggest that there are, and are likely always to be, a considerable proportion of non-vestibuled stock on the railways. Would it not therefore be preferable to combine a shock-absorber with the coupler in order that this fitting may eventually become universal? It appears that the use of the buckeye coupler is increasing in this country and this might be a suitable opportunity of evolving a standard combination.

Yours truly,
J. G. B. SAMS

Railway and Railroad

Bath, July 4

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—The other day a Bath newspaper contained the following extract from its files of June 23, 1838 :—

" On Friday morning, for the first time, some of the Bath, Bristol, and Reading stage coaches travelled from London by the Great Western Railroad to Maidenhead, whence they proceeded to their destination. The time saved to Maidenhead is upwards of two hours."

This extract made interesting reading, especially in connection with the recent accounts in the press of the " pick-a-back " aircraft that have been designed for the North Atlantic mail service. Is this not, in a way, a case of history repeating itself ?

Moreover, the use of the word *railroad* in the description of the G.W.R. is worthy of notice in view of your leader of April 29 last. The following extracts from three letters written by Lady Caroline Thynne, in 1838, 1839, and 1841, further illustrate the old use of the term *railroad* for *railway*. In 1838 she wrote : " I have heard today that the Lascelles accomplished their journey from London to Goldsbro' (above 200 miles) in 15 hours, per *rail road* ; it is now open to York, and very convenient to be able to move a large family so rapidly, and without fatigue to children." In 1839 Lady Caroline wrote : " I made a rapid *rail road* journey, being only four and a quarter hours, from Manchester to Birmingham, about 100 miles." In 1841 she recorded : " I found the road from the *rail road* very heavy and was obliged to have four horses ; the *rail road* was not the worse for the snow."

Yours faithfully,
BATHEASTON

PUBLICATIONS RECEIVED

Scientific Encyclopedia. Published in the U.S.A. by the D Van Nostrand Co. Inc. London: Chapman & Hall Limited, 11, Henrietta Street, W.C.2. 11 in. × 7½ in. × 2½ in. 1,234 pp. Illustrated. Price 50s. net.—This is an impressive and well-produced volume in alphabetical order, and briefly explaining most of the terms entering into the language of scientists and technicians. The explanations are more detailed than are found in any dictionary but on the other hand the treatment of many subjects, such for example as locomotives, railways, or aviation, is brief by comparison with that accorded to these subjects in the best multi-volume universal encyclopedias. Being Americans, the authors have drawn on American practice to illustrate their remarks, and care must be taken not to accept too literally all the generalisations which appear in the text, for some of these are based on the assumption that the American continent comprises the whole world—as, for instance, the remark that typical dimensions for the cylinders of a certain class of locomotive are 25 in. diameter by 34 in. stroke. Due allowance having been made for the American bias, the facts presented may be taken as accurate, and in those branches of science of which we have some knowledge they seem to be quite well chosen. For lawyers, business men, and specialists off their own beaten track, the encyclopedia under review should prove to be a convenient and invaluable work of reference.

Das Institut für Verkehrswissenschaft und das Verkehrswissenschaftliche Studium an der Universität Köln (The Institute for the Scientific Study of Transport, and the treatment of that subject at Cologne University). Second Edition. Compiled by, and issued with the authority of the Principal of the Institute, Dr. A. F. Napp-Zinn. Cologne: The Bottmühle. 8¾ in. × 5¾ in. 23 pp. Price 20 pfennigs.—This publication gives a full account of the work of the institute, which is attached to the Faculty of Economics and Sociology of the University of Cologne and is the eldest and most important body of the kind in Germany. It occupies itself with research into every aspect of transport, and conducts courses of lectures on related topics in association with the university. The institute was founded in 1921 at the suggestion of E. F. C. Soest, then of Hagen, and Dr. B. Harms, of the Institute of Economics and Marine Commerce at Kiel, and was officially recognised as a university body by the Prussian Minister for Science and Fine Arts at the end of 1923. A splendid library has been built up, now comprising some 10,200 items. There is also a special archives department in which a large amount of material of great historical value has been accumulated. The institute has its own journal, and also issues books and pamphlets on transport questions from time to time. Full details of its activities, including lecture courses and fees, are given in this booklet. We note that THE RAILWAY GAZETTE figures in the list of journals regularly received.

N.U.R. Silver Jubilee Souvenir and General Secretary's Report, 1938.—This year the National Union of Railwaymen celebrates its silver jubilee, and in connection with the union's annual meeting at Southport (July 4 and subsequent days), a special Silver Jubilee Souvenir has been published, along with the annual report of the General Secretary. At the beginning of the book appears a portrait of Mr. Michael T. Bass, M.P., the first President of the Associated Society of Railway Servants, 1871, and also a picture of the delegates to the first annual general meeting, 1872. Mr. Marchbank pays tribute to these pioneers and gives a lucid, historical summary of the growth of the A.S.R.S., details of the difficulties encountered, and an outline of notable events of trade union development up till March 29, 1913, when the National Union of Railwaymen was constituted, by the fusion of the A.S.R.S., the General Railway Workers Union, and the United Pointsmen and Signalmen's Society. The combined membership then totalled 159,261. The new union increased its membership by 108,000 in the first nine months of its existence and by the end of 1937 the membership of the union was 364,356. Mr. Marchbank records that there has been an aggregate increase of 88,650 members during the past four years, and he points out that the scope of the union now includes "any transport undertaking in which any railway company has a financial interest."

Mr. Marchbank describes at some length the events leading to the post-war settlement of wages and conditions, and he characterises the National Agreement of 1920 as "one of the most elaborate and extensive pieces of collective bargaining on record throughout the whole history of wage regulations in this country." The General Secretary's annual report, recording in great detail the happenings of the year 1937, will be read by students of railway affairs with almost as much interest as the Silver Jubilee Souvenir, which gives a "brief recital of service and achievement" during the past quarter of a century.

German Travel Literature.—The Tourist Department of the German State Railway has issued a number of maps and booklets in English, designed to help the traveller from this country to plan and spend a successful holiday in Germany—an object in which they will succeed in so far as copious information conveniently presented can help them. One of these publications, entitled "Germany," deals with its vast subject more thoroughly within the compass of an ordinary pocket folder than we recollect having seen done elsewhere in a considerable experience of skimming or ploughing our way through travel literature. It opens out to reveal on one side a large pictorial map of the country, and on the other a map of all surface communications with insets showing air routes and the Reichsautobahn system separately. Railway lines are represented with different symbols for routes with or without express services; towns are differentiated according to population; and the positions of castles, monasteries or places of pilgrimage, and monuments are all marked. This is to say nothing of the informative letterpress under the headings of "Germany, the Beautiful Travel Country"; and "How to Travel in Germany." The latter subject is further elaborated in a separate publication, "Travel in Germany." Similarly exhaustive is the booklet "Germany, the Land of Healing Spas," with its encyclopædic insert entitled "Classification of German Spas, according to the diseases treated and in alphabetical order." Other booklets are "The Rhine" (extensively illustrated and indexed), "Welcome to Germany" (a persuasive introduction to the pleasures and facilities so amply described in the publications already noticed, "Dusseldorf," and "Bayreuth" (two unusual town guides relying for their appeal mainly upon illustrations in colour and monochrome).

Commercial Mahoganies and Allied Timbers.—A report on the above subject has been issued by the Department of Scientific and Industrial Research, and is obtainable from His Majesty's Stationery Office, price 2s. net. It forms Forest Products Research Bulletin No. 18, and is designed to answer queries of the kind frequently addressed by the timber-using industry to the Forest Products Research Laboratory. This bulletin is based on the study of a large number of authentic specimens of the mahogany family of woods, enumerating their characteristics and sources of supply. An index and 10 illustrations of cross-sections of different woods are appended to the bulletin.

Armoured-Plate Battery—A booklet from C.A.V.-Bosch Limited, Acton, London, W.3, quotes opinions of the technical press on the maker's armoured-plate battery, all emphasising the durability and long life secured by this form of construction. Excerpts from 29 journals are quoted. Rigid supports in these cells prevent plate movement, and the separators are of a special chemically pure type. Acid surge is reduced by an ebonite splash-plate. The filler plug incorporates an acid-level indicator. The distinctive feature of these cells is the armoured "finger" construction of the positive plates. These details, and also the robust flat negative plates, are shown in a sectional diagram of a cell which is reproduced in the booklet.

THE SCRAP HEAP

Our monthly contemporary *The Railway Magazine* refers in its current issue to the return, some time ago, of the well-known L.N.E.R. 2-8-2 express passenger engine *Cock o' the North* from its "Vichy" tests. In view of the treatment at Vichy we trust this had no effect on its internal economy! Evidently the Vitry testing station has a new rival.

* * *

N.U.R. MEMBERS AS J.P.'S

The Silver Jubilee souvenir of the National Union of Railwaymen (reviewed on page 51) records the fact that 377 members of the N.U.R. are justices of the peace, and 1,189 members are councillors and aldermen. Included in this figure—which it is claimed constitutes a record for any trade union—are one lord mayor (Mr. E. G. Rowlinson of Sheffield), 14 mayors of boroughs, 8 chairmen of urban district councils, and 13 chairmen of parish councils.

* * *

ONLY AT MIDNIGHT IS TOMORROW TODAY!

Due to a breakdown of his car, a European was stranded at Jhelum—between Rawal Pindi and Lahore, in Northern India—on the evening of May 22. Proceeding to the station, he inquired about a train to continue his journey by rail, and was told at the booking office that the next train was at 00.05 hr. (five minutes after midnight) on May 23. As it was then 10 p.m., he asked for a ticket to Lahore. This the booking clerk refused to issue, saying: "The train for Lahore goes tomorrow, but now it is still today."

* * *

A SERGEANT-MAJOR GUARD ON THE NORTHERN TUBE

At Leicester Square.
Guard: "Now then, get in!"
At Tottenham Court Road.
Guard: "Come on, get in!"

* * *

The following is an extract from an account of an invention for picking up passengers, which appeared in the *Detroit Tribune* in 1891:—

"The business end of the locomotive is to be fitted with alligator jaws forty feet long. These jaws are to be lined with soft rubber, covering flexible steel springs. Two leather throats, or channels, will lead back over the top of the train, one terminating in the baggage car, and the other in a reception car. The whole apparatus is to be under the control of the engineer, and under ordinary circumstances the mouth of the machine will be closed to exclude dust. The *modus operandi* is simplicity itself. An intending traveller need only put his baggage in the track of the locomotive, walk a hundred yards or so and wait for developments. The iron horse will first gobble up the baggage and then its owner, who will find himself sitting on a divan in the reception car before he fully realises what has happened. The ingenious inventor has not yet, however, elaborated his system for setting passengers down."

* * *

CALAMITY HOWLINGS

"Do not let any calamity-howling executive with an income of a thousand dollars (£200) a day, who has been turning his employees over to the Government relief rolls in order to preserve his company's undistributed reserves, tell you—using his stockholders' money to pay the postage for his personal opinions—that a wage of eleven dollars a week is going to have a disastrous effect on all American industry."—*President Roosevelt in a "fireside chat" broadcast.*

* * *

IN AN HOUR

Many things can be done in an hour, but the British railways with their multitudinous services crowd much into every sixty minutes. Calculated on the basis of 365 days a year and 24 hours a day, the railway services cater every hour for 139,000 passenger journeys; 26,000 workmen's journeys; 61,000 excursion, monthly return and week-end ticket journeys; the movement of 10,500 parcels; 33,000 tons of freight traffic; and 1,000 head of livestock. Passenger trains cover 32,000 miles, freight trains 16,000 miles; 2,000 tons of traffic are imported through railway docks; 400 lb. of meat, 300 lb. of potatoes, 30 lb. of butter, and 30 gall. of milk are used on restaurant cars; 1,700 tons of coal are consumed; 1,650 cu. ft. of new timber are used; 600 sleepers and 2,100 bricks are laid, and 250 yd. of cloth is made up into uniforms. The railways need 3,400 gall. of fuel oil and petrol and 800 gall. of lubricating oil; £2,000 is spent on maintaining and renewing the permanent way, signalling, &c. On wages and salaries £11,500 are spent, and hundreds of thousands of signalling movements are made in 10,300 signal boxes which guide the movements of the trains over 50,590 miles of railway tracks.


Daily Mail

BRITISH TRAIN'S 125 MILES AN HOUR

L.N.E.R. speed record impresses the press

* * *

Toll bridges, tunnels, highways, and a dozen different pay-as-you-go public works are cropping up all over America today—harking back to our early history, when travellers paid for new highways because there wasn't money enough to build them otherwise. Private monopolies brought the picturesque old tollgates to an ignominious end. But today public-service corporations prevent profiteering, offering a practical means to secure benefits we want without adding to the general burdens of government. San Francisco's Golden Gate and Oakland Bay bridges—two of the world's largest—are spectacular examples. City or State could never have financed their $100,000,000 cost. They had been a dream for years. Floated as self-liquidating projects, with bonds issued against prospective tolls, they became realities. And the bill is being paid by those who want and use the bridges. —*Condensed from "The Forum."*

* * *

LYNCH LAW IN ENGLAND

Two scoundrels are in custody for deliberate attempts to upset two railway trains. The evidence seems complete, and we trust that the magistrates will send both men for trial, and that the sternest sentence of law will be dealt out. One did his work with a crowbar, the other with what is called a chair—an iron lump, weighing twenty-eight pounds. We seldom advocate the last punishment; but, when one considers the hideous scenes which would have been caused had the miscreants succeeded, it certainly would not be altogether an unsatisfactory thing to hear that Lynch Law had decorated the nearest signal-posts with a warning to all other dastardly wretches like those now in the hands—we hope the iron hands—of justice. —*From the "Illustrated London News" of November 13, 1858.*

* * *

"On Wednesday, May 15, 1848, a new method of travelling on railways was instituted at Lewes. A trial trip took place of a new velocipede propelled by paddles. The object of this portable locomotive is to enable the officers of the railway to pass along the rails without the expense of a steam engine. The speed attained by this means varied from fifteen to twenty miles an hour. The velocipede is simply constructed, consisting of four light iron wheels, to which cranks and paddles are attached."—*From the "Sussex Express."*

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

UNITED STATES

Railway Crisis Unalleviated

Congress has adjourned without enacting any of the Federal loan legislation advocated by the Government to tide the railways over their present crisis without further bankruptcies. Failure to act is attributable to the opposition of the railway labour unions, who were unfriendly, not because the legislation would have harmed them in any way, but merely by way of retaliation against the railways for their proposal to reduce wages by 15 per cent.

The growing intransigence of the railway labour organisations under the favours showered upon them by the New Deal is well illustrated by comparing their behaviour in the present crisis with that of 1932. At that time, when the financial difficulties of the railways were far less serious than they are now, the unions voluntarily agreed to a temporary reduction of 10 per cent. in wages. Now they absolutely refuse to make any concessions whatsoever, although their wage rates are about 7 per cent. higher than they were in 1932.

Western Lines Fail to Earn Their Operating Expenses

For the first four months of the current year the railways have earned only £5,760,000 in excess of operating expenses and taxes, as compared with the far-from-munificent £39,170,000 they earned in the same period in 1937. The Western railways in the first four months failed by £1,800,000 even to earn their operating expenses and taxes, a fact that gives some indication of the desperate condition in which the industry finds itself. The negotiations regarding the proposed decrease of 15 per cent. in wages will begin soon, but little hope can be held out for a peaceful or satisfactory outcome, since the union chiefs are boasting with the utmost truculence that they will concede nothing, and have stated that they will ask the Government to take over the operation of the railways if an attempt is made to enforce a reduction.

Into all the gloom, however, one slender ray of hope is penetrating in that the decline in freight car loadings seems to be relenting. From 30 per cent. below last year's figures a few weeks ago, the weekly carloadings declines have now fallen to about 26 per cent. under last year, indicating that better-than-seasonal improvement is being recorded.

New Broadway and Twentieth Century Trains

In sharp contrast to the financial aspect of the railway situation, the physical front of the industry continues to improve. On June 15 the New York Central inaugurated its new rolling stock for the Twentieth Century Limited, and the Pennsylvania on its Broadway Limited and other limited trains. Most of the new cars in this service are operated by the Pullman Company, only the baggage-mail and dining cars belonging to the railways. The new cars are lightweight alloy steel construction and of the type known in America as streamlined, although the streamlining consists of little more than slightly curving the sides of the cars, providing skirts to hide the accumulators and other machinery under the cars, and applying wide diaphragms between the cars, which give the whole train an appearance of unity. These accelerated services and new stock have been widely acclaimed in the press as illustrative of the ability of the railways to forge ahead despite almost insuperable difficulties.

Trial Trip of New Broadway Limited Stock

On June 8 a " pre-view " run of the new lightweight luxury Broadway Limited train was arranged from the Pennsylvania station, New York, to North Philadelphia. On the outward run the electric locomotive hauled the 13-car train over the intervening 76 miles start to stop in 65 min. 13 sec. The train consisted of the following stock :—

Electric locomotive No. 4861.

Car No.	Description
11	18 roomettes.
10	2 drawing rooms, 4 compartments, and 4 double bedrooms.
9	13 double bedrooms.
8	18 roomettes.
7	18 roomettes.
6	Similar to No. 10.
5	Lounge and 2 double bedrooms.
	Dining car.
	Dining car.
4	Similar to No. 10.
3	18 roomettes.
2	13 double bedrooms.
1	2 master rooms, 1 double bedroom, and observation lounge.

The master room can be engaged by two people for $25 for the whole journey to or from Chicago ; it has its own bath and private radio. The train secretary has his own office, bedroom and toilet, and a microphone by means of which he can make announcements to all cars fitted with loud speakers. There is also a radio-phonograph for broadcasting records. [The roomette type of compartment was illustrated and described in our issue of August 27, 1937.—Ed. *R.G.*]

Smooth-running, Air-conditioned Trains for New 16-hour Schedule

The riding qualities of this new train are spoken of in the highest terms. The ordinary call bells are replaced by three soft chimes. It will be remembered that this train is to cover the 903 miles each way between New York and Chicago in 16 hr., despite the heavy road through the Alleghenny mountains. Also, like all modern American trains, it is fully air-conditioned and is constructed of light all-steel or steel-alloy throughout.

SOUTH AFRICA

Staff Training Committee

A committee styled the Staff Training Committee, has been appointed with the following terms of reference :—

(1) To examine and report upon the existing methods of selection and training of engine cleaners, firemen, station foremen, signalmen, guards, shunters, carriage and wagon examiners and repairers, railcar and rail motor trolley drivers, and operating clerks.

(2) To make recommendations in cases where, in the opinion of the committee, the existing methods of selection and training could be improved.

(3) Whether the existing establishment of staff in training for the aforementioned grades adequately meets requirements or otherwise.

(4) Whether the powers and duties of the inspecting and supervisory staff connected with the responsibility of supervising the afore-mentioned grades are such as to ensure that degree of efficiency essential for correct and safe working.

The committee consists of : Messrs. C. M. Hoffe (Chairman), and G. J. A. Lindenberg, J. Rogan, and J. A. Fourie (members).

Members of the staff who desire to put forward suggestions in regard to matters falling within the scope of the committee's terms of reference have been cordially invited to do so.

Results of Eleven Months' Working

As a fairly reliable index to the financial results for the fiscal year 1937-38, it may be remarked that after meeting all working expenses, including interest but excluding net revenue appropriations, in the results of working all services of the South African Railways & Harbours for the eleven months ended February 28, 1938, there was a surplus of £6,077,950. After making those appropriations, however, the net surplus was £715,844. The principal revenue appropriations were : contributions to renewals fund, £1,695,833; betterment fund, £916,667; rates equalisation fund, £916,667; writing items out of capital account, £699,023.

Railway Health Organisation.

During recent years, the South African Railways and Harbours administration has built up a health branch which is achieving remarkably good results. Anti-malarial measures had been in operation for many years in the malaria districts, but up to 1932 no special department existed to co-ordinate and direct the work. Then, however, a medical officer was appointed to correlate and control all anti-malarial activities and to institute an intensive campaign against the disease.

The appointment of a special officer who could concentrate his whole efforts

on malaria-prevention work, produced results which were little short of amazing, and in 1933 the activities of this officer were extended, with an increased staff, to embrace anti-plague measures, and the supervision of general health and sanitation work on railway property. Thus sprang into being as a distinct unit the Health Branch of the South African Railways. The organisation has now reached a stage where it can cope with any abnormal phase of health work and the staff under the control of the Railway Health Officer now totals 170, of whom 65 are Europeans. The success which has attended the efforts of the branch is exemplified by a remarkable reduction in the incidence of malaria among the railway staff in the Union.

Apart from the counteractive measures against specific diseases, important work is carried out by the health staff in effecting improved sanitation of railway property, and special attention is paid to the protection of water supplies, frequent sampling of train drinking and domestic water supplies being undertaken and submitted for bacteriological examination.

NEW ZEALAND

Farmers' Tours

Arrangements were made recently by the Railway Department for tours in the Dominion by two large parties of New Zealand farmers, to enable them to obtain first-hand information regarding the methods used by fellow farmers, and to inspect a number of the more important industrial works. Further arrangements are now under way for two more rail tours of farmers' parties; the first one will consist of approximately 100 farmers, and the second party will total 150.

Record Coal Consumption

The importance of the railways to the coal mining industry in New Zealand is seen in the fact that the coal used by them during the financial year ended March 31 reached the record total of 511,850 tons, and that the Railway Department uses over 20 per cent. of all the coal mined in the Dominion. In the year ended March 31, 1937, a total of 1,606,227 tons of native coal was carried by the railways, exclusive of that required for their own use, and the quantity conveyed during the current year will probably be considerably higher. Another fact of interest is that only New Zealand coal is used by the railways, which have imported no coal since 1931.

Household Removals by Rail

During the year ended March 31 last, a total of 1,231 removals was handled for households other than those of the railway staff. This is an increase of 260 over the previous year's total. With its own large staff establishment now totalling over 22,600, including tradesmen in every centre capable of doing the work, the Railway Department has developed, through the years, a very efficient system of household removals to deal with the necessary transfers of its own members, and this service was some years ago made available to the general public as well as to other Government departments, and has grown in popularity year by year. The service covers complete insurance against damage of any kind, and the replacement in the new house of everything taken from the old one, exactly as desired.

WESTERN AUSTRALIA

New Pacific Locomotives

The Government Railways are constructing in their Midland Junction workshops ten more "P" class 4-6-2 type locomotives. These engines embody improvements over the original ones built by the North British Locomotive Co. Ltd. in 1924 [and described and illustrated in our issue of December 4, 1925—Ed. *R.G.*]. The valve gear has 6¼-in. instead of only 4½-in. valve travel, and the balancing has been improved. Grease lubrication with floating bushes is used for all the crankpins. The leading dimensions of these 3-ft. 6-in. gauge Pacifics are :—

Coupled wheel, dia.	4 ft. 6 in.
Cylinders (two)	19 in. × 26 in.
Piston valves	10 in. dia.
Working pressure	160 lb. per sq. in.
Heating surface	
Firebox	125 sq. ft.
Tubes	947 ,,
Flues	484 ,,
Total	1,556 ,,
Superheater	363 ,,
Combined heating surfaces ...	1,919 ,,
Grate area	35 ,,
Factor of adhesion	3·56
Adhesive weight	37½ tons
Weight in working order	
Engine	63 tons 13 cwt.
Tender	38 ,, 10 ,,
Water capacity	2,800 gal.
Coal	8 tons
Tractive effort at 85 per cent. boiler pressure	23,638

The engines in the new series are named after rivers, according to the *Commonwealth Engineer*, from which the other information above is also quoted.

INDIA

The Madhupur Derailment, E.I.R.

[As briefly mentioned in the Notes and News Section of our issue of June 24—Ed. *R.G.*] the E.I.R. Punjab mail was wrecked shortly before midnight on June 7, between Madhupur and Jasidih stations, on the Asansol–Mokameh section of the main line. The engine, tender, and five leading bogies plunged down the embankment after leaving the rails and overturned. The driver and a sorter of the Railway Mail Service were killed, and 41 passengers and employees of the Railway Mail Service were injured. Both the firemen on the engine escaped unhurt. By a singular coincidence, one of the firemen was also on the engine involved in the Bihta disaster last year, out of which he had come unscathed. The overturned vehicles comprised the mail van, an intermediate class bogie, and three upper class bogies. It is suggested that the low casualty list in this accident may be due to the presence of mind of the driver, who avoided a too-sudden application of the brakes. The mail van and the intermediate class bogie were badly damaged.

The Agent and the Senior Government Inspector of Railways opened an inquiry into the accident at Madhupur on June 9. The earlier fears of sabotage as the cause of the disaster were confirmed, and the Agent has stated in a letter to the Press that a rail was removed from the track, and has also announced the reward of Rs.5,000.

FRANCE

Railway Operating Deficit

Despite the economies effected by the formation of the Société Nationale des Chemins de fer Français (S.N.C.F.), the railways are still operating at a loss. The deficit is due to the decreasing traffic and to the increasing expenditure arising from higher prices. Article 18 of the railway convention of August 31, 1937, stipulates that any deficit must be covered by increased tariffs and fares, or by a budgetary credit. In accordance with this article, the S.N.C.F. has asked for a rise of 20 per cent. in passenger fares, to come into force automatically on September 3, unless some other means of meeting the deficit is found before that date. In view of the fact that fares were increased when the S.N.C.F. took over the railways on January 1, 1938, any further rise at the present time is strongly opposed. M. Frossard, Minister of Public Works, with the support of various parliamentary committees, has refused permission for the proposed increase of fares. The proposal made by the S.N.C.F. was purely formal, in accordance with the terms of the convention, and hence the refusal was not unexpected. But it leaves the choice of means for covering the deficit to the decision of the Minister.

M. Frossard, in a statement to the Finance Committee of the Chamber, said that the S.N.C.F. had reduced the operating deficit but would not be able to balance expenditure and receipts completely in 1938, for reasons given above. The Minister added that it was hoped to avoid a Government subvention by further reduction of expenditure or by reorganisation measures, aided by the results of rail and road co-ordination.

Technical Reorganisation

As a result of the reorganisation of the technical services of the S.N.C.F. (National Railways), the Mechanical Department of the Region du Sud-Est (ex-P.L.M.) is to specialise in the study and development of steam locomotives and tenders; the Region du Sud-Ouest (ex-P.O.-Midi) in electric locomotives and electric traction material generally; the Region de l'Ouest (ex-Etat) in railcars and loco-tractors; and the Region de l'Est (ex-Est and Alsace-Lorraine)

in carriages and wagons. The Region du Nord will act as a classifying and standardising office to co-ordinate the results obtained in the various regional offices, and will put forward proposals for standardised vehicles for the S.N.C.F. The various studies will be the responsibility of the corresponding Chef Regional de Service du Matériel et de la Traction working in conjunction with the Directeur du Service Central du Matériel.

GERMANY

Intermediate Signalling

It is officially announced that the German State Railway is to adopt what has for some time been known in this country as intermediate signalling, for the purpose of abolishing block posts at present used to divide the line between stations into two block sections. There are a great many intermediate block posts on the German lines, and there should be considerable scope for equipment of this kind. The intermediate signals are to be worked by electric signal machines, and controlled from the signal box in the rear, track circuit or axle counting apparatus being put in to protect the section up to the intermediate block signal and provide an overlap of 200 m. (219 yd.). No emergency front lock release on the signals controlled by such apparatus is on any account to be provided. The standard white light emergency call-on sign—practically the equivalent of the English "P" sign—and a telephone will be provided at all intermediate block signals. Should the track circuit or axle counting equipment be out of order, or should it be necessary to illuminate the permissive call-on sign, an "out of section" message for the previous train must be obtained by Morse ink writer before another is allowed to proceed, as is usual in the case of ordinary block failures at present.

THE NETHERLANDS

Co-ordination with Tramways and Light Railways

For the last year or two working arrangements have been in force between the Netherlands Railways and a number of tramway or light railway undertakings, under which the latter handle goods traffic within certain agreed districts or zones, the railway catering for the longer distance movements, carrying traffic to and from a particular station in each district which serves as a distributing and collecting point for all places therein. This has enabled the railway to close a good many stations to parcel traffic, and at the same time many localities have been given access to the railway. These stations still deal with complete wagon loads, but the local tramway concern remains responsible for the collection and delivery of the contents, either over its rail routes or by lorries, of which the tramways are now making considerable use. In this way quick and efficient door-to-door facilities, co-ordinated between railway, light railway and lorry, are being provided.

The first attempt at such an arrangement was made in 1936 in the Province of Gelderland, and in the following year the system was extended to Drenthe and Overijsel. In the present year a further portion of Drenthe has been included, followed by Friesland, Groningen, Limburg, and South Holland, so that a large area is now covered. The inclusion of North Brabant is in contemplation. The Netherlands Railways have also instituted local motor services of their own where no undertaking of sufficient size existed with which an agreement of the above kind could be concluded.

SPAIN

The Bilbao Bridges

On June 19 the Nationalists celebrated in Bilbao the first anniversary of the taking of the city, by opening four new bridges over the river Nervion; these take the place of those blown up by the Republican forces in their retreat a year ago.

Control of Minerals in Nationalist Spain

According to a Decree published in Burgos on June 9, concessions for the exploitation of mines may be granted only to Spaniards or Spanish companies constituted and domiciled in Spain. At least 60 per cent. of the capital must be held by Spanish nationals and, in the case of limited companies, the chairman and two thirds of the directors must be Spanish. Although all transfers of mining properties made since the beginning of the war were declared null and void by a previous Decree, the Minister is authorised to restore their validity if application is made within 60 days. The general impression is that this Decree will benefit existing British interests in Nationalist Spain, and therefore the railways connected with them, whether owned by the mining companies or worked separately. A possible invasion of the country by foreign concession-mongers is checked, and, if any doubt has been felt as regards the undue exercise of influence by any foreign power after the war, it should be dispelled by this Decree.

Modified Procedure for Labour Tribunals

The Burgos *Boletin Oficial* of June 3 publishes the text of a Decree dated May 13, modifying the procedure for the hearing and settlement of claims and disputes between employers and workmen. The old "mixed juries" or labour tribunals, are abolished, and their functions are assumed by special magistrates acting under the Labour Code, or in districts where there is no specially appointed magistrate, by the judge of first instance. The decisions of the "mixed juries" prior to July, 1936, were fruitful in serious consequences for the railway companies. It is hoped that labour questions will now be decided with a greater regard for the legal and equitable rights of both parties.

CHINA

Nanking-Shanghai Railway

The Japanese military authorities have now imported from Japan a number of diesel and petrol railcars, and are running them to a regular timetable on this line for the benefit of their officers and men. Chinese passengers are carried by one-class ordinary trains made up of abandoned Chinese rolling stock; the fare between the two cities is $3·8, but tickets are issued only to those whose bona-fides have been established. Japanese armed guards are carried, and military engineers are everywhere in evidence directing Chinese coolies and effecting repairs to bridges, stations, and track.

All the bridges had been destroyed either by Japanese bombardment or Chinese demolition, and temporary bridges are numerous. The whole of the permanent way between Shanghai and Soochow was demolished or removed by the retreating Chinese, but between Soochow and Nanking only the bridges and stations were damaged. Some stations have been entirely rebuilt, and in other cases temporary buildings have been run up. Damaged rolling stock is much in evidence, but the telegraph and telephone lines were not destroyed.

Kaiochow-Tsinan Railway

A regular daily train is now running each way between Tsingtao and Tsinan, in spite of the line being periodically cut by Chinese irregulars, but the traffic is almost entirely military. There is a great shortage of rolling stock and what there is has mostly been brought from the South Manchuria Railway. Lorry-owners are, in consequence, doing well, but this activity will cease when the rains begin.

NEW SOUTH WALES

A Buoyant Quarter's Results on Government Railways

Earnings on the New South Wales Railways for the quarter ended December 31, 1937, showed very substantial increases. The total increase as compared with the corresponding quarter of the previous year amounted to £541,222. Coaching revenue increased by £104,981, goods revenue by £412,500, and other revenues by £23,741. Expenditure during the period increased by £346,685, or equal to 64 per cent. of the increased revenue. Passenger journeys increased by 2,760,766 and the principal increases in tonnage were:—General merchandise, 115,792; Grain, flour, &c., 117,088; Coal and coke, 273,639; and Minerals, other than coal and coke, 165,286 tons. The operating ratio for the quarter was 63·59 as compared with 63·53 in the previous year.

BRITISH RAILWAY STATISTICS

"The Railway Gazette" monthly table for Mar., 1938, as compared with Mar., 1937, compiled from the Ministry of Transport Statement No. 220

Description	Great Britain*	G.W.R.	L.N.E.R.	L.M.S.R.	S.R.
PASSENGER TRAIN TRAFFIC—					
Number of pass. journeys (ex. season ticket holders)	100,569,199	6,572,866	13,577,985	22,220,838	17,746,070
Increase (+) or decrease (−)	− 7,400,677	− 873,613	− 1,939,273	− 3,669,586	− 425,122
Passenger receipts (excluding season ticket holders)	£3,580,776	£438,870	£701,773	£1,078,062	£788,336
Increase (+) or decrease (−)	− £724,087	− £125,378	− £156,717	− £277,827	− £138,496
Season ticket receipts	£861,331	£49,047	£140,188	£209,333	£307,173
Increase (+) or decrease (−)	+ £14,694	+ £1,057	+ £3,104	− £182	+ £8,076
Parcels and misc. traffic receipts (excluding parcels post)	£1,126,490	£209,569	£347,049	£420,579	£127,057
Increase (+) or decrease (−)	+ £41,840	+ £12,948	+ £22,166	+ £3,009	+ £31
FREIGHT TRAIN TRAFFIC—					
Freight traffic (tons) (excluding free-hauled)	23,572,270	5,759,188	10,639,179	11,068,340	1,352,385
Increase (+) or decrease (−)	− 558,378	+ 131,541	− 342,704	− 373,816	+ 16,987
Net ton-miles (excluding free-hauled)	1,391,355,711	265,167,636	469,234,628	562,476,917	58,320,660
Increase (+) or decrease (−)	− 13,024,223	+ 5,821,221	− 2,365,939	− 15,677,566	+ 1,572,483
Average length of haul (miles) (excluding free-hauled)	59·03	46·04	44·10	50·82	43·13
Increase (+) or decrease (−)	+ 0·83	− 0·04	+ 1·16	+ 0·29	+ 0·63
Freight traffic receipts	£7,661,973	£1,325,000	£2,506,268	£3,191,000	£400,938
Increase (+) or decrease (−)	+ £59,604	+ £40,300	+ £13,268	− £10,000	+ £19,704
Receipts per ton-mile	1·322d.	1·20d.	1·28d.	1·36d.	1·65d.
Increase (+) or decrease (−)	+ 0·023d.	+ 0·01d.	+ 0·01d.	+ 0·03d.	+ 0·04d.
Freight train-loads: Average train-load (tons)	132·79	139·18	137·26	130·42	110·61
Increase (+) or decrease (−)	− 0·88	+ 0·65	− 1·80	− 1·22	+ 2·98
Net ton-miles—					
Per train engine-hour	991·10	1,054·56	1,059·47	935·89	843·82
Increase (+) or decrease (−)	+ 34·92	+ 24·02	+ 34·70	+ 41·96	+ 17·50
Per shunting-hour	932·38	852·77	1,039·83	954·32	618·74
Per total engine-hour	480·42	471·50	524·78	472·51	356·98
Net ton-miles per route-mile per working day	3,082	3,123	3,288	3,615	1,256
Increase (+) or decrease (−)	− 3	+ 99	+ 2	− 63	+ 42
Wagon-miles. Total	384,333,454	71,358,267	135,020,057	159,369,631	18,241,866
Increase (+) or decrease (−)	− 5,490,256	+ 680,363	− 864,334	− 4,944,110	− 31,420
Percentage of loaded to total	66·35	67·19	64·28	67·76	66·15
Wagons per train. Total	34·41	34·65	34·79	34·31	32·30
Increase (+) or decrease (−)	− 0·62	− 0·63	− 0·70	− 0·64	− 0·16
Loaded	22·83	23·28	22·36	23·25	21·37
Empty	11·58	11·37	12·43	11·06	10·93
Train-miles. Coaching—Per train-hour	15·16	14·14	14·34	14·31	18·00
Per engine-hour	12·27	11·29	11·12	11·10	15·34
Train-miles. Freight—Per train-hour	8·79	9·20	9·08	8·38	9·28
Per engine-hour	3·62	3·41	3·87	3·62	3·18
Engine miles. Total	47,597,935	7,727,152	13,287,926	17,521,826	6,255,167
Increase (+) or decrease (−)	+ 103,799	+ 118,371	+ 36,448	− 162,806	+ 143,988
Mileage run by engines. Total train-miles—					
Coaching	23,116,186	3,154,336	5,317,725	7,330,748	4,657,089
Freight	11,170,430	2,059,304	3,881,322	4,645,440	564,697
Engine-hours in traffic. Total	5,193,678	914,405	1,557,696	2,034,382	500,761
Increase (+) or decrease (−)	− 96,686	+ 7,316	− 26,754	− 74,293	+ 221
Shunting miles per 100 train-miles—					
Coaching	7·24	6·95	6·63	7·72	7·60
Freight	70·71	81·40	64·76	66·96	92·69

Passenger Traffic Statistics: Number of journeys, receipts, and receipts per journey (excluding season ticket holders)—March, 1938

Subject	Great Britain	G.W.R.	L.N.E.R.	L.M.S.R.	S.R.	Cheshire Lines	Liverpool Overhead	L.P.T.B.†	Mersey
Full fares—									
Pass. journeys	32,127,717	582,795	879,657	1,212,147	2,618,689	12,596	169,337	25,822,867	80,117
Gross receipts	£840,091	£66,835	£113,607	£114,037	£182,118	£2,180	£1,807	£344,947	£1,409
Receipts per pass.	6·28d.	27·52d.	31·00d.	22·58d.	16·69d.	41·54d.	2·56d.	3·21d.	4·22d.
Reduced fares—									
Excursion and week-end—									
Pass. journeys	35,400,194	3,607,165	7,957,780	12,147,040	8,099,369	374,598	76,948	1,531,236	647,234
Gross receipts	£1,943,741	£290,658	£433,540	£697,401	£430,497	£20,116	£755	£32,774	£9,925
Receipts per pass. journey	13·18d.	19·34d.	13·08d.	13·78d.	12·76d.	12·89d.	2·35d.	5·14d.	3·68d.
Workmen—									
Pass. journeys	29,532,523	1,957,512	3,977,876	7,810,120	6,300,478	280,750	262,992	7,696,306	284,934
Gross receipts	£440,323	£29,883	£66,803	£130,035	£105,366	£4,831	£2,278	£86,872	£2,505
Receipts per pass. journey	3·58d.	3·66d.	4·03d.	4·00d.	4·01d.	4·13d.	2·08d.	2·71d.	2·11d.
Other—									
Pass. journeys	3,500,858	423,650	760,819	1,048,289	726,528	28,406	52,749	389,784	9,810
Gross receipts	£345,391	£49,220	£85,157	£131,424	£69,295	£3,741	£353	£3,510	£210
Receipts per pass. journey	23·68d.	27·88d.	26·86d.	30·09d.	22·89d.	31·61d.	1·61d.	2·16d.	5·14d.
Total—									
Pass. journeys	100,569,199	6,572,866	13,577,985	22,220,838	17,746,070	696,396	562,026	35,440,193	1,022,095
Gross receipts	£3,580,776	£438,870	£701,773	£1,078,062	£788,336	£30,920	£5,193	£468,103	£14,049
Receipts per pass.	8·55d.	16·02d.	12·40d.	11·64d.	10·66d.	10·66d.	2·22d.	3·17d.	3·30d.

* All standard gauge railways

† Includes passengers originating on the railway undertakings, and on the Whitechapel and Bow Joint Railway

RAILWAY COMMUNICATION BETWEEN BERLIN AND VIENNA

A brief survey of the development of important trunk routes and their relationship to political changes

HERR B. MEINKE gives some interesting details of the development of railway services between Berlin and Vienna in a recent issue of the *Zeitung des Vereins*. It will surprise many to know that as early as 1849 it was possible to go all the way from Berlin to Vienna by rail, *via* Oderberg. The German—or rather Prussian—section of the route was made in stages, beginning with the Berlin—Frankfort (Oder) line in 1842, and reaching Myslowitz in Silesia, the centre of a coal mining district, in 1846. The Austrian Kaiser Ferdinands Nordbahn reached Leipnik in 1842, and the company was informed by the Prussian Ambassador in Vienna that his own country was waiting for a sign of willingness in Austria to aid in the establishment of a through route. The Nordbahn therefore went ahead with extensions and reached the Prussian frontier near Oderberg in 1848. Four years earlier the two countries had made an agreement to join their railway systems, wherein it was stipulated that Berlin should be reached from Vienna in 32 hours and Hamburg in 44. The Prussian lines reached Annaberg in 1847, but the Oder bridge was not completed until 1849, when through communication was established.

In the meantime a connection between Vienna and Prague was being debated, and in 1845 a line from the latter city to Olmütz was opened, and a line from Brünn was connected to it at Trübau in 1849. A convenient route between Berlin and Dresden *via* Jüterbog and Röderau was opened in that year and it remained only to connect Prague and Dresden to make a second route between the Austrian and Prussian capitals. A route had been surveyed, for it was seen how useful such a main line would be in the great trade channel between the North Sea and the Adriatic. Agreement was reached with Saxony to make its own part as far as Niedergrund on the Elbe, and in 1851 the line was opened. In 1857 the Südbahn reached Trieste, and the great north to south trunk route was thus complete.

Neither the Oderberg nor Dresden route was the shortest possible between Berlin and Vienna, and in 1853 proposals were made for a route *via* Reichenberg, itself an important industrial centre, which meant making a line from Pardubitz to Reichenberg in Austria; this was done by 1859, but efforts to complete the route *via* Zittau to Cottbus, and thence to Berlin were not then successful. Another proposal in 1855 for a route *via* Görlitz, Glatz and Wildenschwert likewise came to nothing at first. Later this route was formed by pieces of line made at odd intervals, but by 1880, when it was complete, it had no importance for through traffic.

After 1870 the various Austrian railway systems entered into lively competition. The Kaiser Franz-Josef system completed the Vienna—Gmünd—Prague line in 1871, making a third route to Berlin. In 1872 the Nord-Westbahn constructed its line from Vienna *via* Znaim, and from Iglau to Jungbunzlau, which connected there with another company's line to Reichenberg and was on the direct route to Berlin as the crow flies, so that for a year or two a through train was run *via* this route. In 1874 the Nord-Westbahn obtained connection with the Saxon lines *via* Tetschen, and, avoiding Prague, this made the most direct route to Saxony, so that when in 1875 the Berlin—Dresden line *via* Elsterwerda was complete a fourth and shortest route to Berlin was finished.

Since 1875 the four chief routes have therefore been:—

Route	Miles
1. Breslau—Oderberg	491
2. Dresden—Bodenbach—Prague—Brünn ..	486
3. Dresden—Bodenbach—Prague—Gmünd ..	457
4. Dresden—Tetschen—Kolin—Iglau	434

Up to and partly during the war these routes carried the principal expresses, of which there were many, between the capitals. From time to time proposals were heard, supported by interested industrialists, for expresses to be put on the Görlitz—Reichenberg route, although the Austrian Railway Department was not in favour of it, and even as late as 1916, when a different end to the war was hoped for by the Central Powers, the suggestion was supported by the city of Görlitz. The outcome of the war and the creation of Czechoslovakia caused all such plans to fall to the ground, and had a marked influence on the old routes. The Oderberg route was least affected, and expresses were put on again in 1921. Czechoslovakia made all services *via* Bodenbach and Tetschen run *via* Prague, the Kolin—Iglau route being given up for international services. Germany and Austria therefore put on a night service *via* Passau, although the route was 583 miles long. At first the time taken was about 19 hr., but had fallen to 13½ hr. by 1937 and is scarcely longer than by the routes through Czechoslovakia. The Passau route is now entirely German, and in March this year a day (12 to 12¾ hr.) service was put on, while active steps are being taken to improve matters further. A new curve at Regensburg will enable the terminus there to be avoided, and trains to run fast to Passau, where there are now no customs formalities. The Passau—Wels section is to be doubled and given heavier track. The plans for making a deviation to avoid the heavy incline between Plauen and Hof, often discussed, will probably be again taken up in order to shorten journey times still further.

The New Rhine Bridges

On April 3 Dr. Dorpmüller, German Minister of Transport and General Manager of the State Railway, with the Premiers of Baden and Bavaria and the Reichsbahn divisional managers at Mainz and Karlsruhe, opened the new combined rail and road bridges at Speyer on the Speyer-Heidelberg line, and at Maxau on the Wörth-Karlsruhe line. These were built to replace the bridges on boats that had done duty for over half a century. The precedence accorded by statute to river traffic always caused great inconvenience to the railway, while the restrictions on the size of locomotives and vehicles over such bridges made the routes useless for important trains. Improved means of communication between Baden and the Bavarian Palatinate or Pfalz have long been needed, and a desire to facilitate river traffic assisted in prompting the abolition of the old bridges. The growth of industries in the district and of motor traffic also demanded better road communication between the two banks of the river. With the new summer timetable operative from May 15, the Trier-Karlsruhe railcar service has been routed *via* the new Maxau bridge. There are now 25 railway and 16 road bridges—some combined—over the Rhine.

NEW 0-6-2 TYPE TANK LOCOMOTIVE FOR THE WAR DEPARTMENT

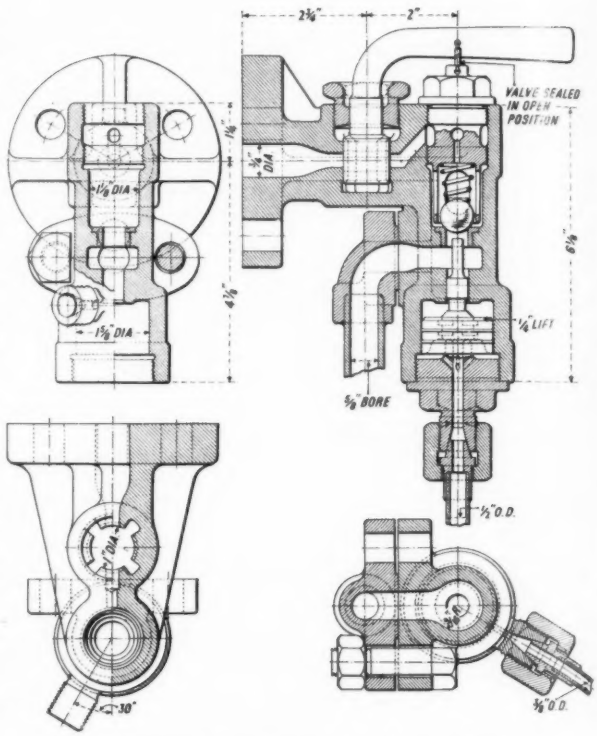
This engine has been specially designed and equipped for instructional purposes on the Longmoor Military Railway

WE recently inspected a new 0-6-2 type side tank locomotive designed and built by W. G. Bagnall Limited, Stafford, to the requirements of the Royal Engineers Training Centre at Longmoor Camp, Hampshire. Being intended for instructional purposes, the engine is equipped with special fittings of particular interest and value to the trainees at the camp. This distinguishes it from an otherwise straightforward and typical British type of tank engine having the 0-6-2 wheel arrangement, and ranks it in many particulars not only as a thoroughly modern locomotive, but one which indeed must be placed in a classification by itself. We were very favourably impressed with the general excellence of the workmanship and finish exhibited in this new engine, which, taken as a whole, presents a clean and substantial appearance in spite of the extra items of equipment incorporated in its design.

As the illustrations show, the locomotive carries electrical equipment embodying a 550-watt, 24-volt turbo-generator supplying current to front and back headlamps, full lighting in the cab, and inspection lamps, together with plug connections for train lighting. This equipment was supplied by J. Stone & Co. Ltd., of London. An automatic jumper blastpipe top and ring of the G.W.R. pattern is used, the functioning of which is simple and at the same time most efficient. With heavy loads the jumper ring rises, thus increasing the area of the blastpipe orifice by sixteen 1-in. diameter holes, or approximately 12½ sq. in. By thus automatically increasing the capacity of the blastpipe with the jumper top and ring, a freer outlet for the exhaust is available under normal and maximum load conditions, with a corresponding reduction of back pressure in the cylinders.

Continuous blowdown valve mounting in the cab

Another item of equipment is the Lambert wet sanding gear applied to the front of the leading and back of the trailing coupled wheels. This gear relies for its efficiency on the fact that sand has an affinity for water, and in operation deposits a mixture of sand and water on the rail, with the result that almost any kind of sand can be used. This system ensures that the maximum co-efficient of friction is maintained, owing to the emulsive condition of the sand adhering to the rails (with dry sand, trouble is often experienced from the wind blowing the sand away from the rail); there is the further advantage that the possibility of sand getting into the moving parts of the motion is avoided.



Automatic continuous blowdown valve

The engine has outside cylinders with inside-admission piston valves actuated by Walschaerts gear, and reversing is effected by means of an ordinary pull and push reversing lever working in a rack. An automatic continuous blowdown valve of the L.M.S.R. pattern is fitted to the firebox back, and takes water from a point 2 in. above the highest level of the crown of the firebox. The bottom of the valve is connected to the steamchest, so that by opening the regulator, the valve automatically comes into operation. This permits of continuous blowing down from the boiler of a discharge of water at such a rate that the concentration of sodium salts is kept just below that at which priming may occur. The rate of discharge is controlled by a small orifice in the valve, and depends upon the amount of sodium salts in the feedwater.

The brake equipment of the locomotive combines Westinghouse automatic brake on the engine, and a vacuum ejector. The Westinghouse brake has two valves, Nos. 4 and 9. Of these, the No. 4 valve operates the Westinghouse brake on the engine and train through a triple valve and double check valves. The No. 9 valve is quick-acting and is used for shunting purposes, operating the air brake on the engine only. The vacuum ejector actuates a proportional valve which provides means for

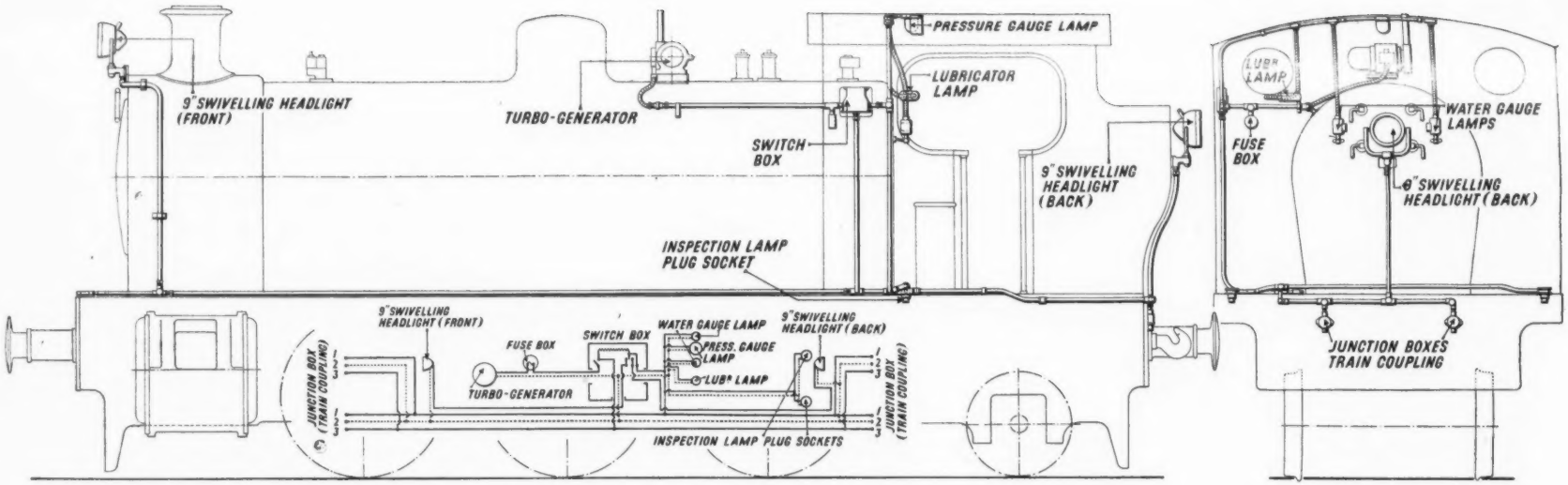
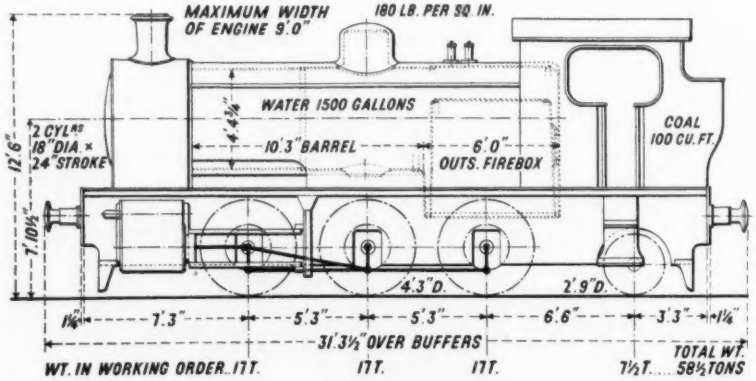
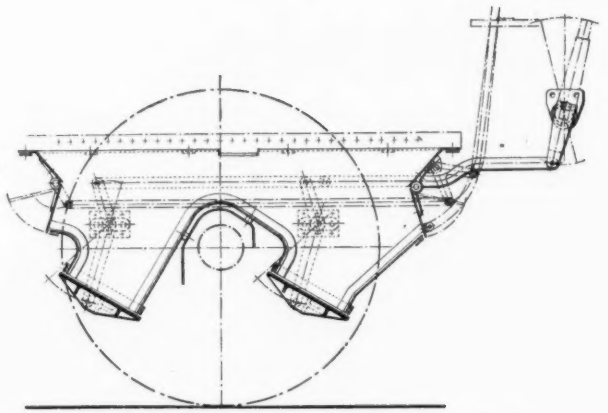


Diagram showing layout of electric light generator, wiring, and connections



General dimensioned diagram



Arrangement of ashpan over rear coupled axle

NEW 0-6-2 *INSTRUCTIONAL TANK LOCOMOTIVE, WAR DEPARTMENT*

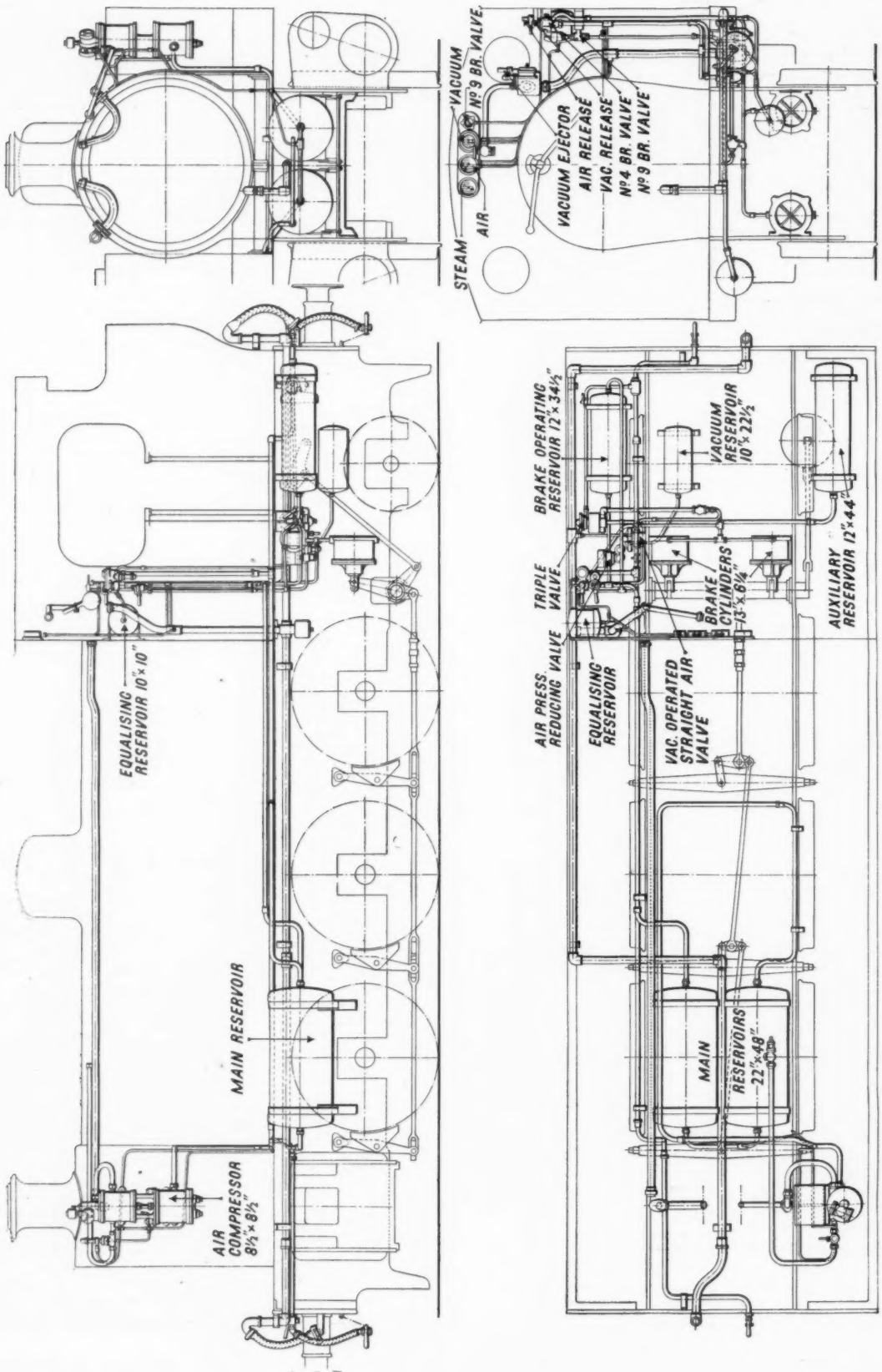
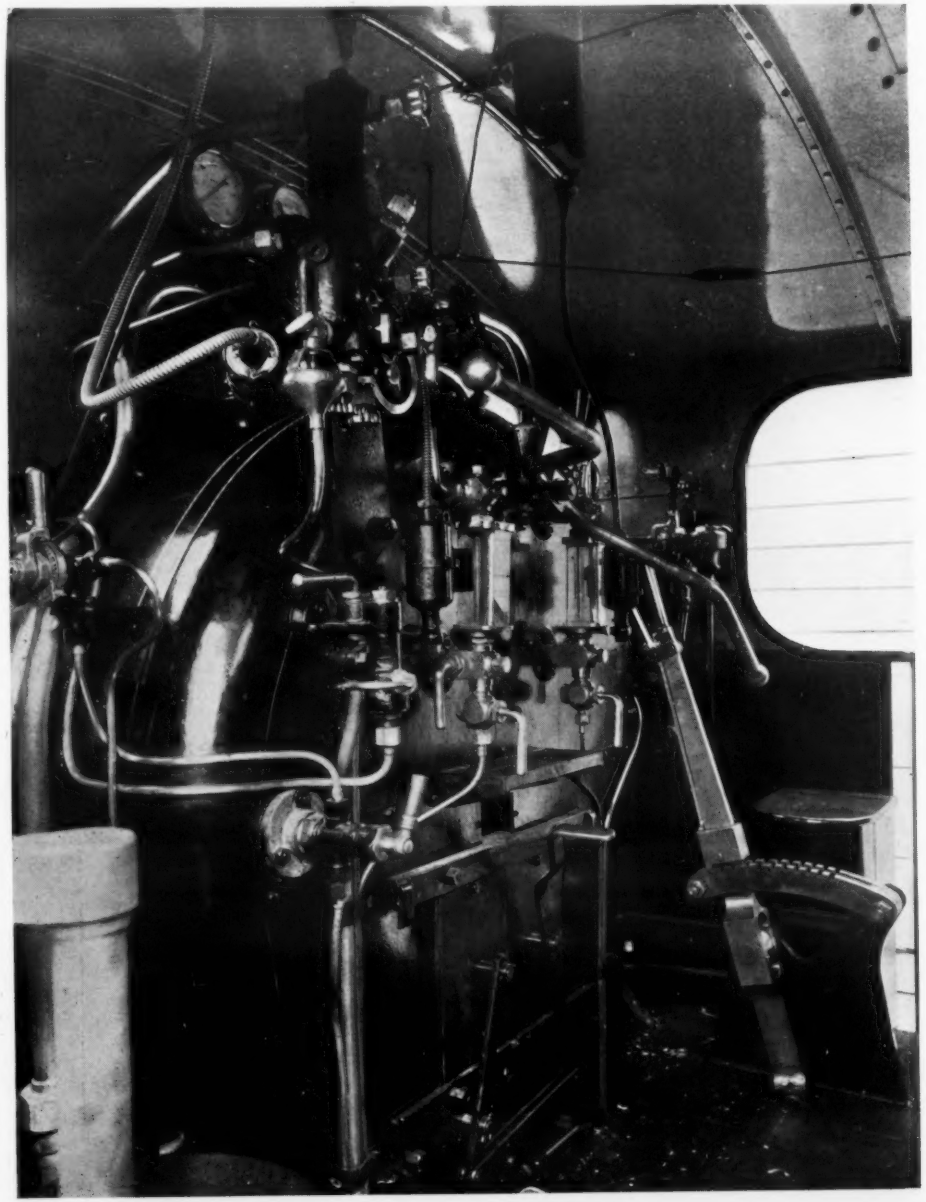
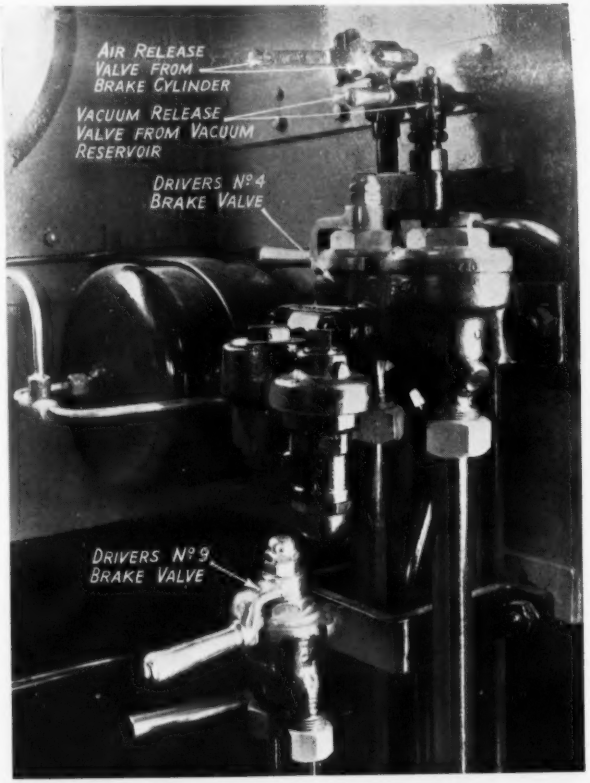


Diagram of new 0-6-2 instructional tank locomotive for the War Department, showing layout of compressed air and vacuum brakes

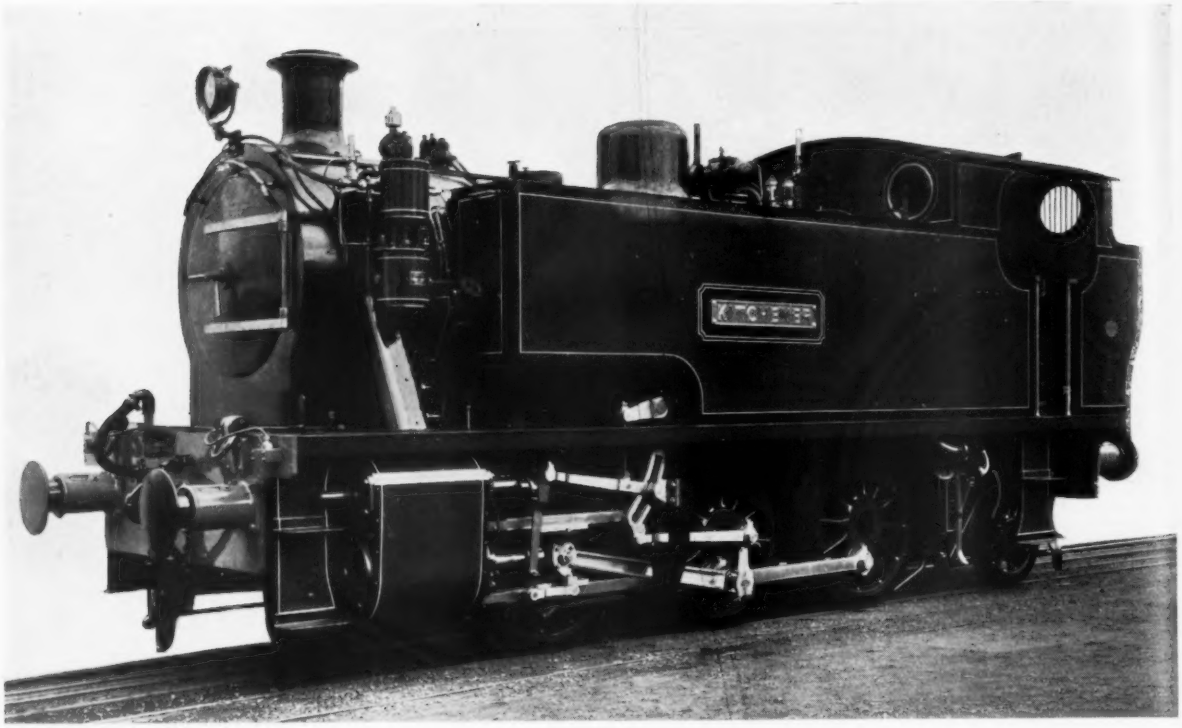




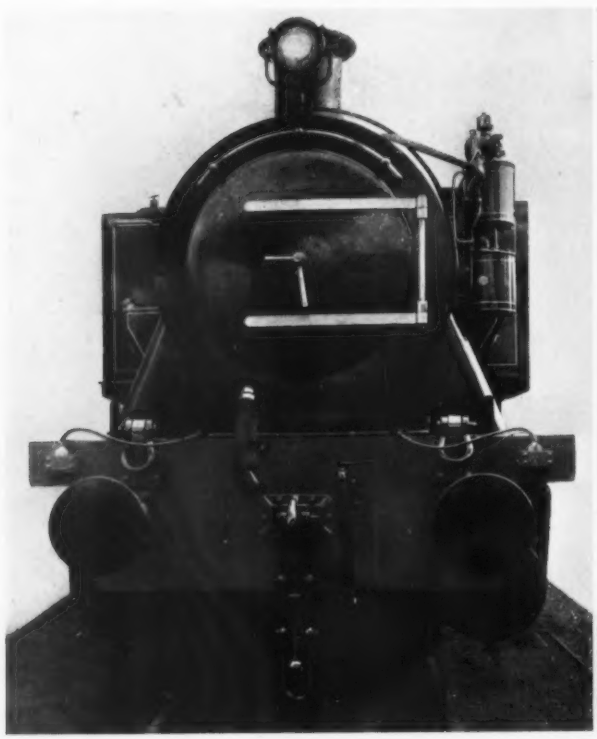
Above: Compressed air and vacuum brake controls in cab

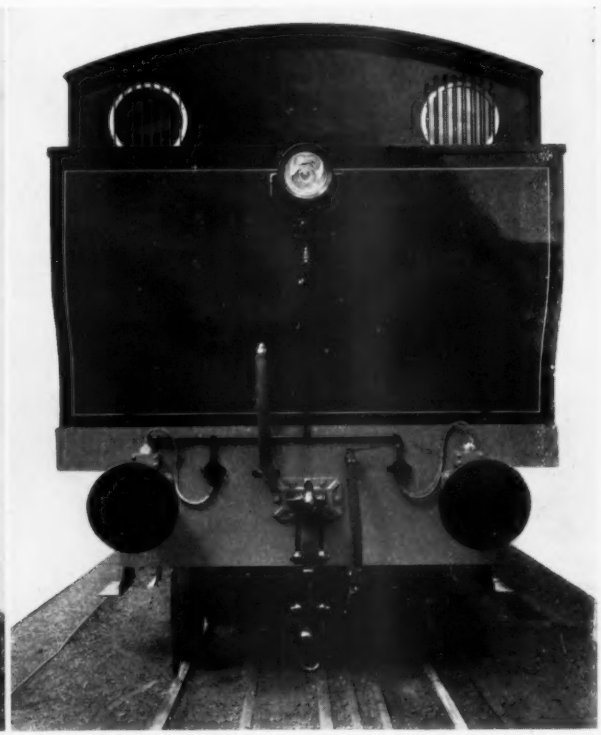
Left: View in cab showing regulator, reversing lever, and various fittings

NEW 0-6-2 INSTRUCTIONAL TANK LOCOMOTIVE, WAR DEPARTMENT



General view showing various fittings





Front and rear views showing air and vacuum brakepipes, headlights, and plug connections for train lighting

NEW 0-6-2 INSTRUCTIONAL TANK LOCOMOTIVE, WAR DEPARTMENT

automatically applying the air brake on the engine when handling a vacuum braked train, the degree of application and release being in proportion to that on the train. In addition, a hand brake is provided.

There is nothing specially noteworthy in the layout of the boiler, except perhaps that it is not provided with a superheater. The outside firebox is of the round top pattern with direct stays to the copper inner firebox. The boiler is clothed with asbestos mattresses supplied by Dicks Asbestos Co. Ltd., and two 2½-in. Ross pop patent safety valves are fitted.

The general characteristics of the design, apart from the equipment, are rapid acceleration from a standstill and good grade climbing, which are of importance where an engine is more frequently used for shunting than for continuous running All but 7½ tons of the engine weight is available for adhesion, the actual adhesion weight being 51 tons, distributed equally over the three pairs of coupled wheels. It is built for the 4 ft. 8½ in. gauge, and develops a tractive effort, at 85 per cent. of the boiler pressure, of 23,325 lb.

The following are the principal dimensions:—

Cylinders (2), dia.	18 in.
Piston stroke	24 in.
Wheels, coupled, dia.	4 ft. 3 in.
Wheels, trailing, dia.	2 ft. 9 in.
Boiler heating surfaces:—	
Tubes	975 sq. ft.
Firebox	99 ,,
Total	1,074 ,,
Grate area	18 ,,
Wheelbase, rigid	10 ft. 6 in.
,, total	17 ft. 0 in.
Length of engine overall	31 ft. 3½ in.
Weight of engine in working order	58·5 tons
Water capacity	1,500 gal.
Fuel capacity	100 cu. ft.

The engine is painted in War Office green, and lined in black and white. The paint used is Dulux, supplied by Nobel Chemical Finishes Limited. It is of a pleasing shade and gives a smooth uniform semi-matt finish, with, we were informed, more than usually durable qualities.

LARGE COAL-HANDLING PLANT LUNG-HAI RAILWAY, CHINA

General Electric plant for transferring coal from rail either to storage or to ship

THE Lung-Hai Railway, which has proved such a bone of contention in the present war in China, has been responsible for important mining and other industrial developments in that part of the country. It is very up to date in its equipment, and among other installations is a large coal-handling plant, the contract for the supply and erection of which was awarded to the General Electric Co. Ltd. in 1934; the mechanical and structural parts of the work was entrusted to the Fraser & Chalmers Engineering Works of that undertaking.

Storage ground and part of coal handling plant. The travelling throw-off carriage operates along the belt conveyor on this bridge, delivering coal to the storage ground

Briefly this plant consists of a steam (turbine) electric power house, containing two 700 kVA. turbo - alternators generating 3,300-V. three-phase 50-cycle current. The coal-handling is effected by a system of interconnected belt conveyors with a 60-ton Marshall wagon tipler at the receiving end, as described in our issue of August 2, 1935. The coal is emptied from the wagon into a large receiving hopper, whence it is drawn by three belt feeders at the rate of 400 tons an hour, and fed to the first of the series of conveyors, provided with an automatic continuous belt weigher, which records the weight of the coal passing. Thereafter the coal is either lifted by further conveyors and run along an overhead bridge supported by widely-spaced truss trestle legs straddling the storage dumps—which are 1,640 ft. long, and are capable of holding 160,000 tons of coal—or it is carried by an underground conveyor beneath the storage ground for direct delivery to ships by other conveyors and a travelling loading tower. Coal is also conveyed by this underground conveyor from the storage dumps, which feed it directly through a number of gate openings arranged at intervals along the tunnel, the feed to the conveyor being by a travelling feeder car running along the tunnel.

Means are provided on the feeder car for opening or closing by power the gates at any particular opening in the roof of the tunnel. A second automatic continuous belt weigher is provided to record the supply to the ships. Power used throughout is electric, and control is effected from two control stations, where simply-arranged push buttons secure the correct sequence for starting and stopping the conveyors. One of these control stations also issues instructions to the operators in the tunnel by means of a system of light signals.

NEW FLYING SCOTSMAN TRAINS, L.N.E.R.

Two trains recently built at the company's works at Doncaster, have been introduced in the summer service between King's Cross and Scotland

TWO new trains have recently been built at the Doncaster works of the London & North Eastern Railway, to the designs of Sir Nigel Gresley, Chief Mechanical Engineer, by whose courtesy we are able to reproduce drawings, photographs and particulars. The new trains began running in the Flying Scotsman service between King's Cross and Scotland on July 4. They are finished in the familiar L.N.E.R. varnished teak, and have the following formation:—

SUMMER WORKING—

	Passengers First	Passengers Third	
Brake third	—	24	Aberdeen
Third class	—	42	,,
Composite locker	12	21	,,
Third class	—	42	Edinburgh
Buffet lounge	—	20	,,
Third class	—	42	,,
Third class restaurant car	—	42	,,
Kitchen car	—	—	,,
First class restaurant car	36	—	,,
First class	24	—	,,
Third class	—	42	,,
Luggage van	—	—	,,

Excluding the restaurant cars the seating capacity is 36 firsts and 213 thirds. The total tare weight of the train is 426 tons. For the spring working two additional vehicles are included, making the formation as follows:—

SPRING WORKING—

	Passengers First	Passengers Third	
Brake third	—	24	Glasgow
Composite	12	24	,,
Composite locker	12	21	Perth
Third class	—	42	Edinburgh
Third class	—	42	,,
Buffet lounge	—	20	,,
Third class	—	42	,,
Third class restaurant car	—	42	,,
Kitchen car	—	—	,,
First class restaurant car	36	—	,,
First class	24	—	Edinburgh
Composite locker	12	21	Aberdeen
Third class	—	42	,,
Luggage van	—	—	,,

The total seating capacity, exclusive of restaurant cars, is 60 firsts and 258 thirds, and the total weight 503 tons.

Thirteen vehicles only are used in the winter working, the Glasgow, Perth and Aberdeen portions being formed as in the spring working, and the leading third class carriage in the Edinburgh portion omitted. The passenger accommodation throughout the train, with the exception of the buffet lounge and the restaurant cars, consists of corridor vehicles, and every effort has been made to ensure the maximum of comfort for the individual passenger. The sound insulation, which has been so successfully used in the " limited " trains, *e.g.*, the Coronation and Silver Jubilee, has also been applied to the Flying Scotsman. Double glass is used throughout, and acoustic blanket insulates the sides and roof. The floor insulation, in addition to compressed felt between the floorboards, comprises sprayed asbestos below the floor supported on corrugated steel sheeting. The whole train is fitted with Stone's pressure ventilation apparatus.

Varying colour schemes have been used throughout each train, and the walls are all covered with Rexine. The first class compartments each seat four passengers, and have walls and ceilings covered with peach-coloured Rexine. The smoking compartments are upholstered in a blue and fawn uncut moquette with sponge rubber fillings to the headrests and armrests and special spring fillings in the seats; a silk-covered cushion is provided for each passenger. Curtains of figured blue silk lined with silver satin hang at every side window. The floor is covered with a blue Wilton rug, and the whole of the metal fittings are chromium plated. The compartments are exceptionally well-lighted, a 30-watt single light fitting being fixed in the ceiling and 30-watt reading lights at every passenger seat. Every compartment is fitted with special " no-fume " ash trays. The non-smoking compartments are similarly arranged with regard to seats and fittings, but red is the predominant colour, whilst flowered fawn uncut moquette is used as the seat covering.

A special feature of the first class coaches is the exceptional width of the corridor. The first class corridors throughout the train are covered with blue carpet with a sponge rubber underlay, and the vestibules with cocoa fibre mats. The whole of the corridors and vestibules are lined with flush panels of polished teak.

Scheme of Decoration

The scheme of decoration chosen for the third class compartments has produced an air of spaciousness and light. The walls are covered in peach-coloured Rexine and the seats are upholstered in fawn and brown uncut moquette. The provision of special spring fillings has ensured an exceptionally comfortable seat. The metal fittings are chromium plated, with the exception of the ceiling light, which is of Alumilited aluminium. This fitting has a 30-watt lamp, and every compartment is also provided with four 15-watt shaded reading lamps above the seat backs. There is also a hair mat in every compartment.

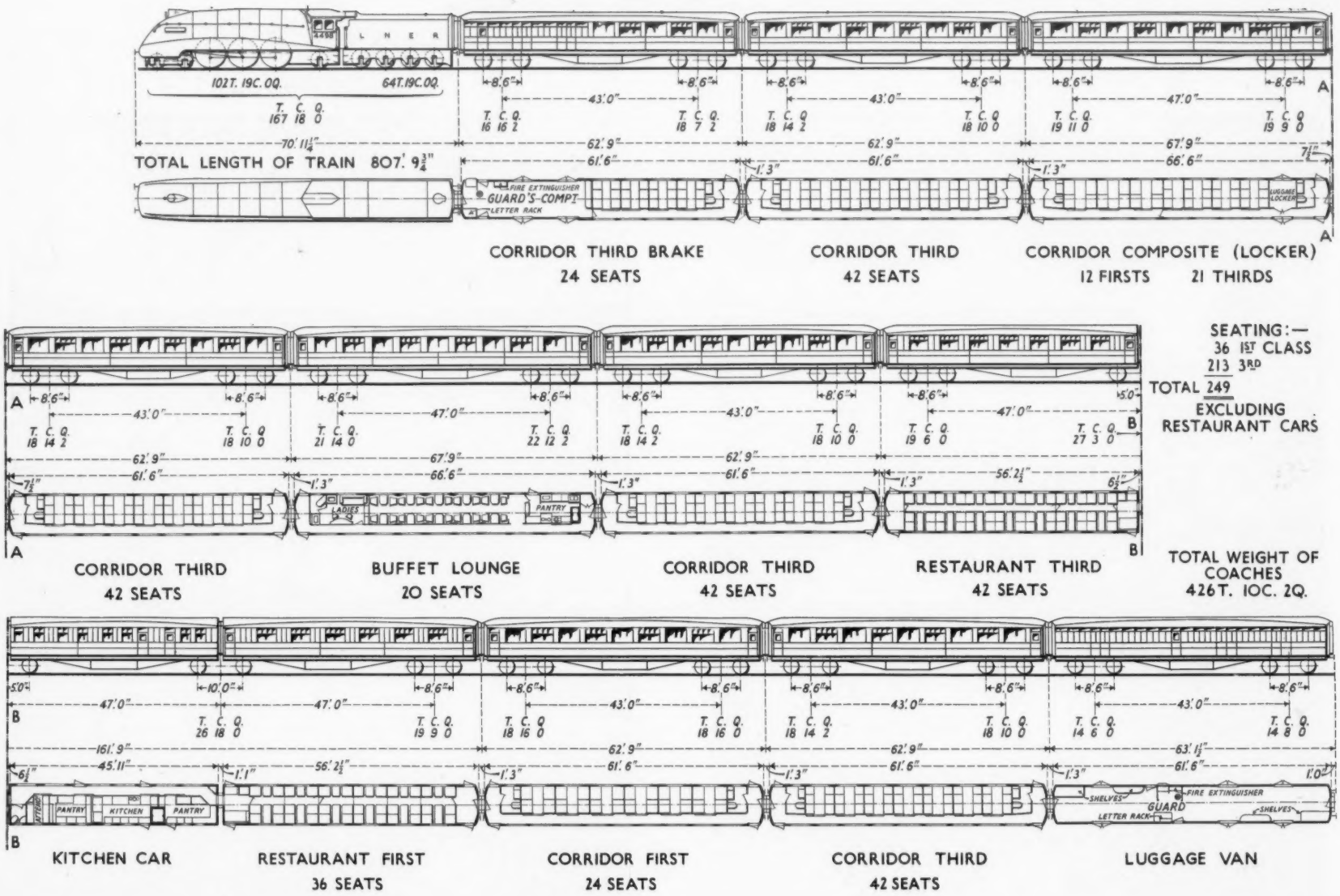
The restaurant car set is the only articulated vehicle on the train, and comprises first and third class saloons with an electric kitchen between. The third class saloon follows orthodox practice, the seating being arranged in separate smoking and non-smoking saloons. The ceilings and upper portions of the saloon walls are covered with cream Rexine, and the lower portions and doors are of Rexine having a shagreen finish with a dividing band of red. The dado line, door architraves and ceiling fittings are of aluminium with Alumilite finish. The upholstery material is fawn and red uncut moquette.

The first class saloon is a distinct departure from the usual standards, and is a development of that in the Coronation train. Each section of six seats is separated from the next by means of a light metal partition which is panelled in Perspex, a transparent synthetic resin. This material is also used in the saloon intermediate doors. The colour scheme is blue and silver relieved by the warmth of the carpet of bois-de-rose. The covering for the upper walls and ceiling is of pale blue Rexine with Rexine of a darker blue below the waist, the whole framed and finished with Alumilited aluminium extrusions. The rose-coloured, silver lined curtains provide the necessary foil to the powder blue upholstery of the chairs, the plain antimacassars of which are also outlined in rose coloured embroidery. The luggage rack above every window is also

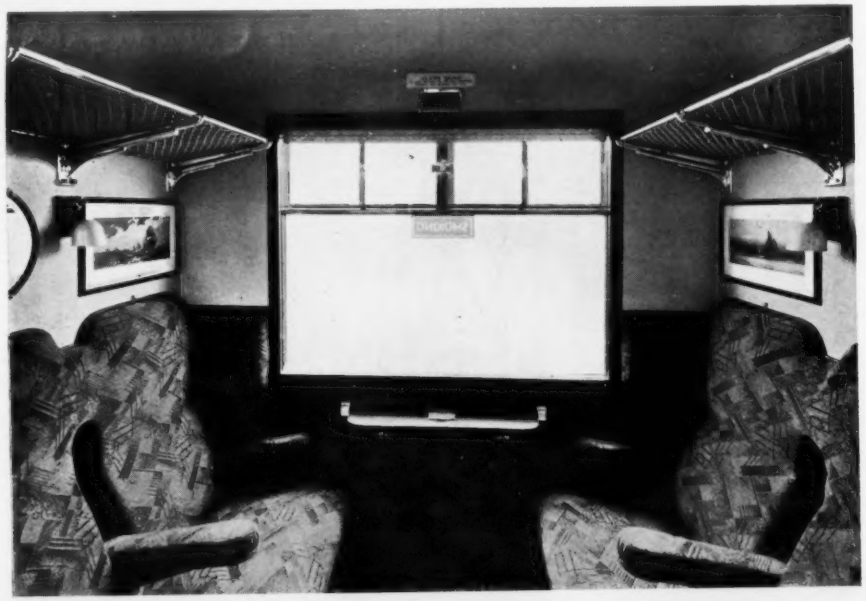
Buffet car

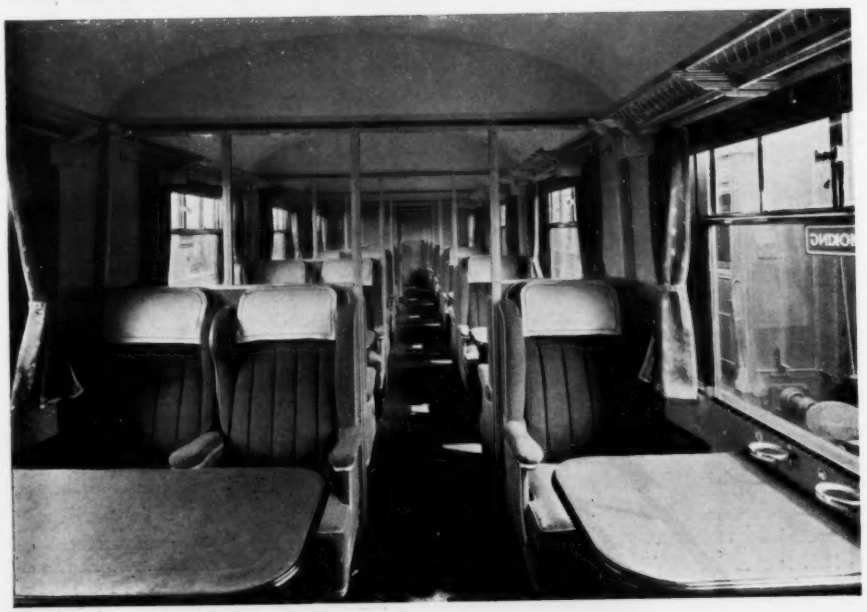
Third class dining car

THE NEW FLYING SCOTSMAN TRAINS, L.N.E.R.



Summer formation of the two new Flying Scotsman trains, L.N.E.R. For spring working two additional vehicles are to be included, making the total seating capacity (exclusive of restaurant cars) 60 first class and 258 third class





Above : First class corridor compartment

Top, left : Third class corridor compartment

Bottom, left : First class restaurant car

NEW FLYING SCOTSMAN TRAINS, L.N.E.R.

of aluminium with Alumilite finish, and incorporates a 30-watt lamp at each end; a 30-watt ceiling fitting completes the illumination of each section.

The scheme of interior decoration differs in each train. In one scheme the walls are covered in silvered green Rexine, whilst the panels below the windows are of silver Rexine with a pink tinge. The ceiling is painted cream, and the stepped surrounds vary from pale green to the green of the Rexine. Mirror pilasters with etched ornamentation divide each passenger section, and the whole of the cornices, window surrounds, arches, and ceiling ornaments are of Alumilited aluminium. Curtains of striped green, yellow and black with red braid are provided at the outer and corridor windows, and the floor is covered with brown cork tiling. The chairs are upholstered in green.

In the buffet car of the other train, the predominant colour is rose, with maroon upholstery on the chairs. Adjoining the buffet is a ladies' lounge and toilet room provided with settee, dressing tables, and two washbowls. The toilet compartments are similar throughout the train, the first class being decorated in green Rexine, and the third class in yellow. The coloured washbowls and sealed hoppers match the Rexine finish, whilst the hot and cold water supplies are obtained from solenoid-controlled valves operated by push buttons.

The Electric Kitchen

The electric kitchen equipment follows the practice successfully used in all the latest L.N.E.R. trains; stainless steel is extensively used. The range comprises a boiling top, one steaming and two roasting ovens, the vegetable boiler is a separate unit, placed conveniently adjacent to the sinks. Hot water for general purposes is provided from tanks in the corridor roof. A hot cupboard and coffee machine, together with a large electric refrigerator, complete the kitchen equipment. Separate pantries are provided for serving the first and third class saloons. The power for the cooking apparatus is obtained from two axle-driven dynamos, each of 10-kW. output, and a battery of traction type cells with a capacity of 210 amp. hr.

Buffet Lounge Car

A novel feature of the train is the provision of a buffet lounge car in which light refreshments may be obtained. This vehicle is entirely independent of the restaurant cars and is intended for the convenience of passengers who do not require to avail themselves of the full restaurant car service. The pantry equipment is all-electric and comprises a coffee machine, automatic toaster, ice cream cabinet and refrigerator. The buffet saloon has been decorated to the designs of Acton Surgey; and seats twenty passengers at small tables.

The whole of the train is supplied with fresh filtered air by means of electrically controlled pressure ventilation apparatus, which during cold weather automatically warms the air to a comfortable temperature. In summer time filtered air is delivered at atmospheric temperature. The ventilator power unit is placed on the underframe and delivers the air at floor level by way of insulated ducts, the vitiated air being discharged through grilles into the roof duct, which is connected to extractor ventilators. For those who prefer direct ventilation, deep sliding ventilators with a large opening are provided in every compartment and in the corridors.

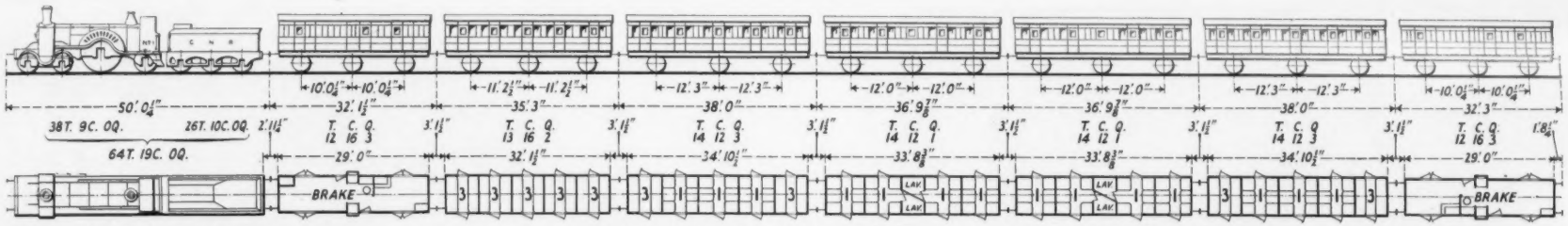
The train is electrically lighted throughout, every vehicle except the kitchen car being fitted with its own axle-driven dynamo and double battery, which also provides power for the pressure ventilation unit. The whole train is coupled by means of buckeye automatic couplers connected to indiarubber springs, and the gangways between the coaches are Pullman vestibules. The coach bodies are built of teak and are mounted on steel underframes of welded construction; compound bolster bogies ensure that the riding shall be of the high standard associated with the L.N.E.R.

The following contractors have supplied materials for these trains :—

Bogies	Metropolitan-Cammell Carriage & Wagon Co. Ltd.
Wheels	Taylor Bros. & Co. Ltd.
White metal	Anti-Attrition Metal Co. Ltd.
Indiarubber springs	G. Spencer, Moulton & Co. Ltd.
Bearing springs	Ibbotson Bros. & Co., Ltd., and English Steel Corporation Limited.
Bolster springs	Turton Bros. & Matthews Limited.
Axlebox lubricators	Armstrong Oiler Co. Ltd.
Acoustic blanket and sprayed asbestos	J. W. Roberts Limited.
Dovetailed steel sheeting	Beckett, Laycock & Watkinson Ltd.
Glass and mirrors	Pilkington Bros. Ltd.
Perspex	I.C.I. (Mouldrite) Limited.
Triplex	Triplex Safety Glass Co. Ltd.
Sliding shutter ventilators	J. Beresford & Sons Ltd. A. G. Wild & Co. Ltd.
Upholstery materials	T. F. Firth Limited. J. Holdsworth & Co. Ltd.
Carpets	T. F. Firth Limited.
Seat fillings	Vi-Spring Products Limited.
Armrest fillings	Dunlop Rubber Co. Ltd.
Rexine	I.C.I. (Rexine) Limited.
Aluminium decoration and fittings	Alumilite Limited.
Aluminium	Northern Aluminium Co. Ltd.
Cork tiles	G. Stephenson & Son Ltd.
Electric light fittings	Vickers Train Lighting Co. Ltd.
Lamp shades	Marlborough Shade Company. Crayonne Limited.
Locks and handles	J. Kaye & Co. Ltd.
Electric cooking and lighting equipment	J. Stone & Co. Ltd.
Traction-type cells	Chloride Electrical Storage Co. Ltd.
Stoves	Henry Wilson & Co. Ltd.
Coffee machines	W. M. Still & Co. Ltd.
Refrigerator units	Frigidaire Limited.
Lavatory hot water units	W. M. Still & Co. Ltd.
Lavatory push-button control	J. Stone & Co. Ltd.
Pressure ventilation apparatus	J. Stone & Co. Ltd.
Train lighting cells	Chloride Electrical Storage Co. Ltd. Pritchett & Gold, & E.P.S. Co. Ltd. Vickers Train Lighting Co. Ltd. J. Stone & Co. Ltd.
Vacuum brake cylinders	Gresham & Craven Limited.
Vacuum and steam heating couplings	Lightalloys Limited.
Washbowls and hoppers	Twyfords Limited.
Lavatory floor covering	Korkoid Decorative Floors.

Spring Compensators for Double-Wire Working

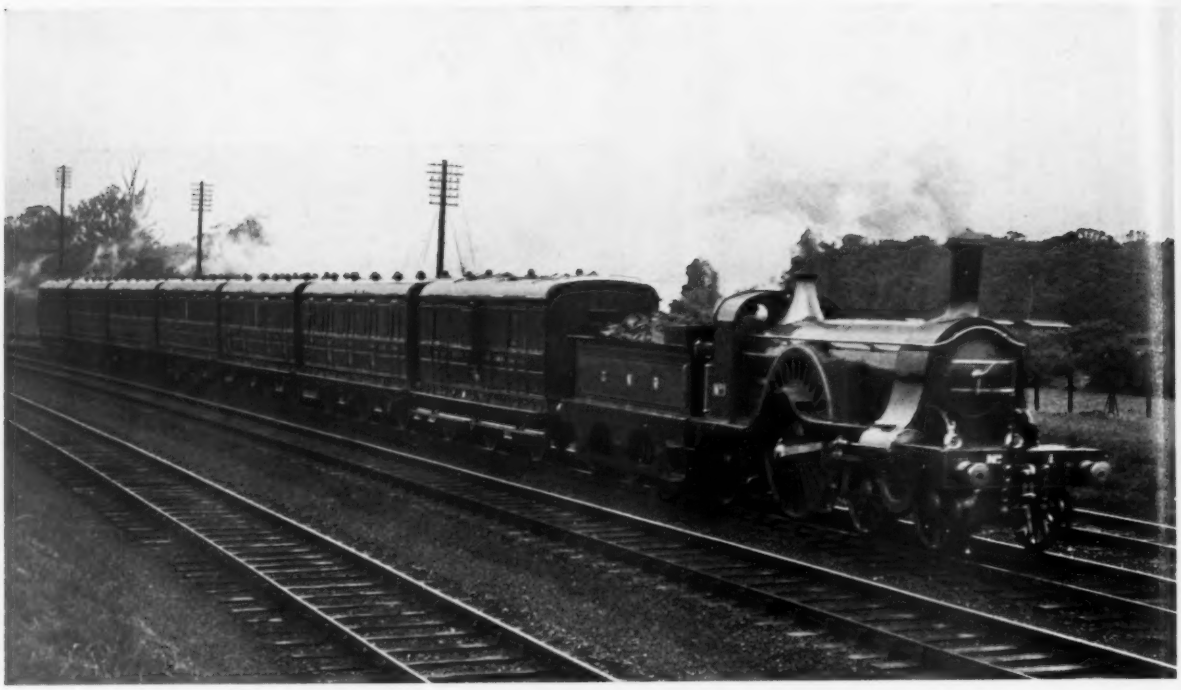
Compensators used in double-wire signal and point operation, although differing at times in certain details, have hitherto been constructed on the general principle of using a weight or weights to keep the transmission taut under changes of temperature. In the event of wire breakage—a very rare occurrence with well-made double-wire equipment—the compensator serves to keep or put signals at danger, or operate locks on point mechanisms and interlocking control gear at the point levers. To economise materials and obtain a simpler form of compensator, a spring-operated design has recently been produced in Germany, effecting a saving of 70 per cent. in material. The usual locking principle is used. The spring, of $\frac{7}{16}$-in. dia. wire, exerts a tension on the transmission varying from 154 to 187 lb. Of very compact form, the compensator can be used for points up to 380 yd. from the lever, and for certain types of signal movement. A full description appears in the *Zeitschrift für Eisenbahn-Sicherungswesen* for May 1. 1938.



Composition of train representing the Flying Scotsman of 1888. *The locomotive* (G.N.R. *No.* 1) *and carriages were all representatives of the period which have been preserved by the* L.N.E.R.

Comparative silhouettes of the Flying Scotsman 1888 *and* 1938 *demonstration trains run on Thursday of last week* (see page 77)

Aerial view at Knebworth of the 1888 *train during the demonstration run on June* 30

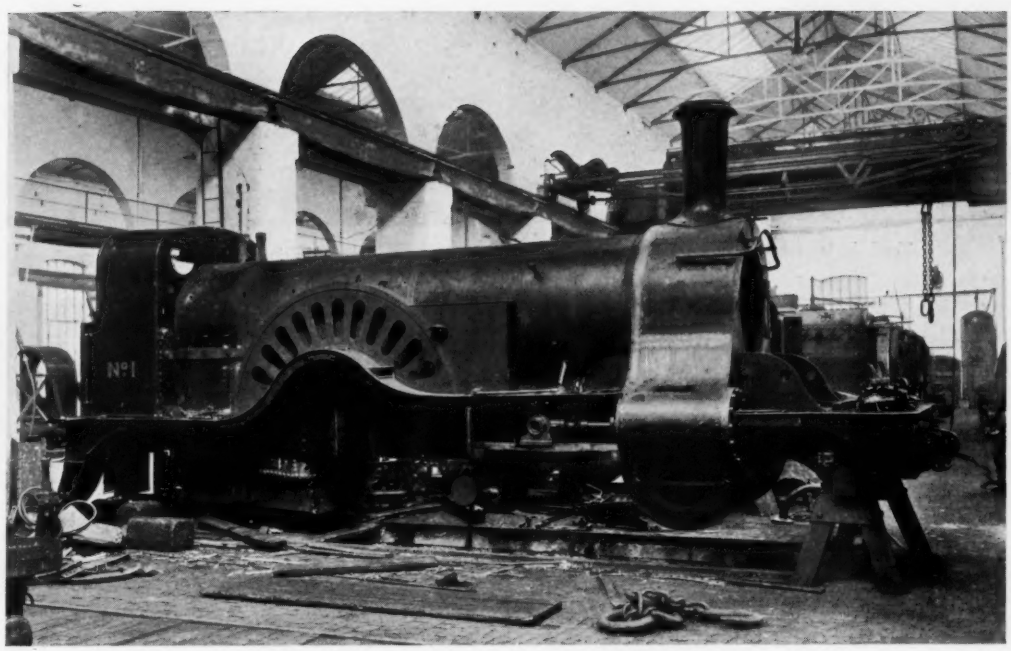


Locomotive No. 1, G.N.R. at the head of a train of typical six-wheeled stock as used in the Flying Scotsman of 1888

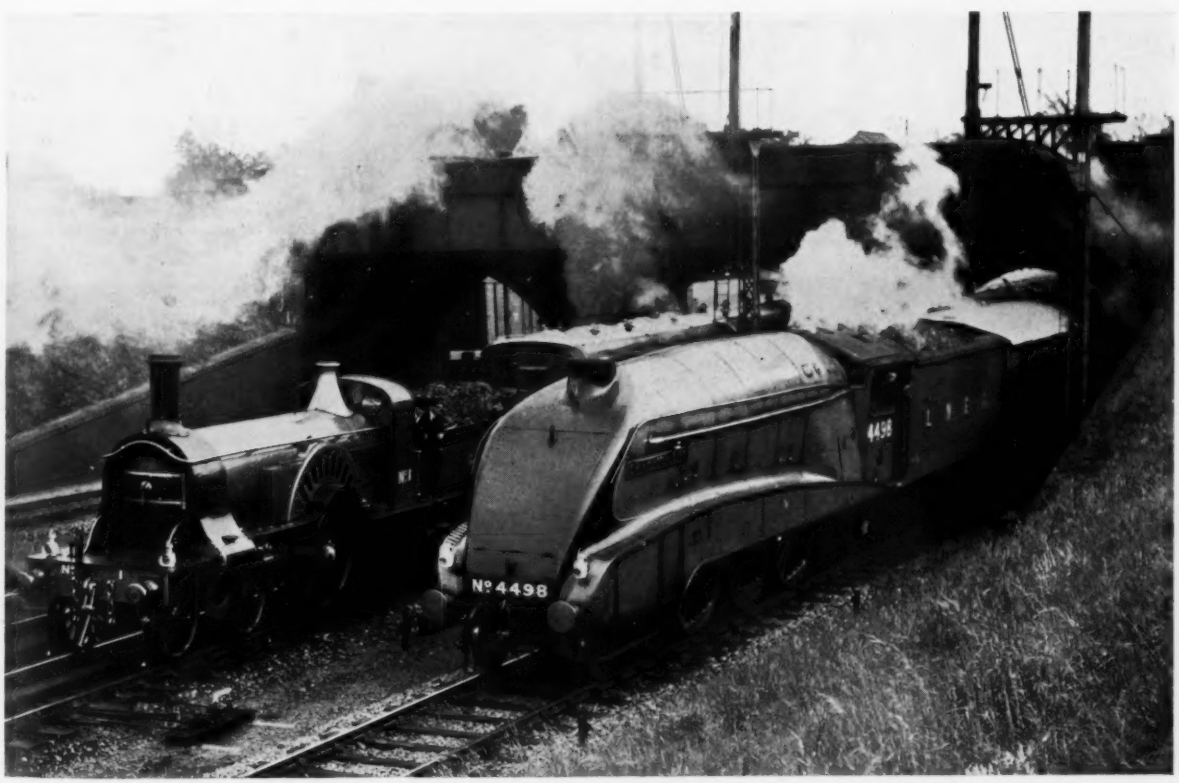
Locomotive No. 4498, "Sir Nigel Gresley," L.N.E.R. hauling the train of new stock just built for the Flying Scotsman services

Photos by] [E. R. Wethersett

THE OLD AND THE NEW FLYING SCOTSMEN



Locomotive No. 1, G.N.R., under repair in the shops. The engine was taken out of service in September, 1907, but preserved; it was in steam for the Darlington Centenary procession of 1925, and has since been in the York Railway Museum

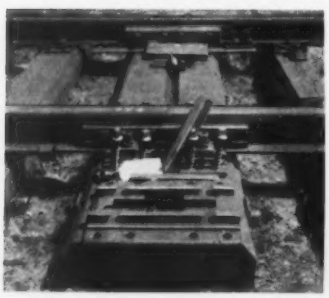


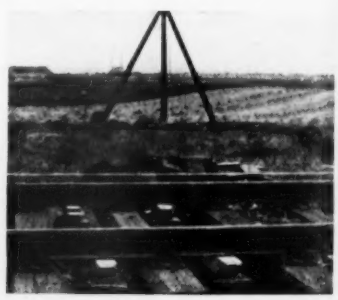
Photo] *The new Flying Scotsman train alongside the 1888 train at Stevenage station, L.N.E.R.* [Topical

Track lifting machine at work

Preparing ballast for relaying track

Left: New rails set to true level and alignment, with sleepers being placed in positions marked on rails (note—for demonstration purposes—lower level of rails for steel sleepers in background). Right: Forms being filled with ballast for steel sleepers





Left: Demonstration section of track showing insulated joints, joint soleplate, rail anchor, &c. Centre: Typical stretch of German main line, showing ample ballasting, signal box, and well-placed signal. Space for widening the line has been provided between the signal box and the nearest track. Right: Track supported for ballast renewal under traffic

Group including Mr. Carpmael (the President) and Dr. Neumann, and Reichsbahn staff at Hamm marshalling yard

Dr. Dorpmüller speaking at the Reichsbahn banquet in Cologne on June 28; Mr. Carpmael sitting

P.W.I. CONVENTION IN GERMANY (see pages 48 and 81)

RAILWAY NEWS SECTION

PERSONAL

L.M.S.R. Appointments

The London Midland & Scottish Railway announces that Mr. Ashton Davies has been appointed Acting Vice-President (Railway Traffic, Operating and Commercial) during the absence of Mr. E. J. H. Lemon on special Government service. Mr. T. E. Argile has been appointed Acting Chief Commercial Manager in place of Mr. Ashton Davies.

Mr. F. A. Pope has been appointed to a new position of Superintendent of Operation under Mr. T. W. Royle, Chief Operating Manager.

G.W.R. Appointments

The following appointments are announced by the Great Western Railway, and are to take effect from August 1 next:—

Mr. A. V. R. Brown, Assistant Divisional Superintendent, Bristol, to be Divisional Superintendent, Chester.

Mr. J. W. Pepler, Chief Clerk, Divisional Superintendent's Office, Bristol, to be Assistant Divisional Superintendent, Bristol.

Mr. C. W. Powell, Chief Clerk, Divisional Superintendent's Office, Worcester, to be Chief Clerk, Divisional Superintendent's Office, Bristol.

Mr. L. J. Hamblin, Junior Assistant to Divisional Superintendent, Birmingham, to be Chief Clerk, Divisional Superintendent's Office, Worcester.

L.N.E.R. Appointments

The London & North Eastern Railway announces the following appointments:—

Mr. H. M. Collings, Assistant to the London City Manager, to be London Suburban District Goods Manager.

Mr. A. G. Croxall, Assistant to the Goods Manager, Southern Area, to be Assistant London City Manager.

Engineer Atanasio Iturbe, Chairman, Local Board, Central Argentine Railway, sailed for England on a combined business and pleasure trip on May 6.

W. A. Walber & Co. Ltd., 38, Victoria Street, Westminster, the London representative of the Park Gate Iron & Steel Co. Ltd., and Ward, Haggas & Smith Limited, announces that Mr. F. A. West and Mr. C. E. Kearton have been appointed Directors, Mr. A. C. Walber remaining Managing Director.

Mr. Robert A. Thom, O.B.E., whose forthcoming retirement from the post of Mechanical Engineer, Southern Area, L.N.E.R., was announced in our issue of May 27, was born at Aberdeen in 1873; he received his scholastic education at public schools in Aberdeen, and his technical education at Robert Gordon's College, Aberdeen, subsequently serving an apprenticeship from 1888 to 1893 in the locomotive, carriage, and wagon works of the Great North of Scotland Railway. From 1893 to 1898 Mr. Thom remained in the service of the Great North of Scotland Railway as Inspector and Deputy Works Foreman, and in the latter year became Foreman in the Metropolitan Railway Company's works at Neasden, London, later taking up a position as Works Foreman with Thomas Beeley & Sons at Hyde Junction, Manchester. In October, 1902, Mr. Thom was appointed Locomotive, Carriage & Wagon Superintendent (including Running Department) of the old Lancashire, Derbyshire & East Coast Railway, and continued in that capacity until the line was absorbed by the Great Central Railway in January, 1907. He was then transferred to Gorton as Assistant Locomotive Works Manager, and in January, 1913, became Assistant to the Chief Mechanical Engineer, G.C.R. On the formation of the London & North Eastern Railway, Mr. Thom was appointed District Mechanical Engineer, Great Central Section, and in 1924 became Mechanical Engineer, Scotland. In 1927 he was appointed Mechanical Engineer, Doncaster, and from that date had charge of the locomotive, carriage, and wagon interests on the Great Northern and Great Central Sections. On January 1, 1934, Mr. Thom was appointed Mechanical Engineer, Southern Area, and took over the locomotive, carriage, and wagon interests of the Great Eastern Section in addition to the Great Northern and Great Central Sections. Mr. Thom is a member of the Institution of Mechanical Engineers, Vice-President of the Institution of Locomotive Engineers, and a Member of the Institute of Transport.

Mr. Robert A. Thom, O.B.E.
Mechanical Engineer, Southern Area, L.N.E.R., 1934-38

Indian Staff Changes

Mr. R. Lean, Chief Mechanical Engineer, M. & S.M.R., returned from leave and resumed duty on June 20.

Mr. T. Stephenson has been appointed to officiate as Chief Commercial Manager, M. & S.M.R., as from April 19.

Mr. A. C. Rose has been appointed to officiate as Senior Deputy Agent in place of Mr. Stephenson as from the same date.

Mr. B. A. Berry has been appointed to officiate as Junior Deputy Agent, M. & S.M.R., as from May 17.

Mr. T. R. Pauchapagesan has been appointed to officiate as Deputy Director, Railway Clearing Accounts Office, as from May 14.

Mr. R. G. Manson, Chief Operating Superintendent, A.-B.R., has been granted 8¼ months' leave as from May 31.

Mr. V. L. Thompson has been appointed to act as Chief Operating Superintendent and Mr. J. H. Stamford Smith as Deputy Chief Operating Superintendent during the period of Mr. Manson's leave.

Mr. Lazarus Moses Kaganovitch, who vacated the position of Commissar of Transport in the U.S.S.R. about 18 months ago to become Commissar of Heavy Industries, has again taken over

the transport commissariat, but still has charge of the Department of Heavy Industries. Mr. A. V. Bakalyn has been acting as Commissar of Transport during the past seven months.

Sir Maurice W. Brayshay, who recently retired from the position of Agent, Bombay, Baroda & Central India Railway, has been elected to the board of the Bengal & North Western Railway Company.

The King has been pleased to confer upon the Rt. Hon William Douglas, Baron Weir, G.C.B.—whose elevation to a Viscounty was announced in the recent Birthday Honours list published in our issue of June 10 last—the title of Viscount Weir, of Eastwood in the County of Renfrew.

The King has been pleased to confer upon Sir Josiah Charles Stamp, G.C.B., G.B.E., Chairman and President of the Executive Committee of the London Midland & Scottish Railway—whose elevation to the peerage was announced in the Birthday Honours list published in our issue of June 10—the title of Baron Stamp, of Shortlands in the County of Kent.

The King has been pleased to confer upon Mr. Vivian Hugh Smith, Director of Associated Electrical Industries Limited—whose elevation to the peerage was announced in the Birthday Honours list published in our issue of June 10—the title of Baron Bicester of Tusmore in the County of Oxford.

French Railways Technical Reorganisation

In connection with the important technical reorganisation of the French National Railways described in our Overseas columns on pages 54-55, it is of interest to note that the following officers of the Mechanical Department are responsible for the various branches of work, under the direction of M. Jean Levy, Chef du Service Central du Materiel:—

	Region	Branch of Work
M. Japiot ...	Sud-E t...	Locomotives and tenders.
M. Cardon ...	Sud-Ouest	Electric locomotives and traction material.
M. Herbert...	Ouest ...	Railcars and tractors.
M. Wisdorff	Est ...	Carriages and wagons.
M. Lancrenon	Nord ...	Co-ordination, classification and standardisation.

We regret to record the death in Buenos Aires on May 12 of Senor Alejandro Lertora, a former President of the Local Board of the Buenos Ayres Western Railway.

Mr. Ashton Davies, O.B.E., Chief Commercial Manager, L.M.S.R., who, as announced above, has been appointed Acting Vice-President (Railway Traffic, Operating and Commercial), L.M.S.R., entered the Telegraph Department of the Lancashire & Yorkshire Railway in 1890. He subsequently went to the Passenger Superintendent's Office and eventually became Personal Assistant to that officer. He was appointed Superintendent of the Line in 1919. Upon the amalgamations in 1921 and 1923, Mr. Ashton Davies became first Northern Divisional General Superintendent, London & North Western Railway, and then General Superintendent, Western Division, L.M.S.R. In 1924 he was appointed General Superintendent (Freight Services) on January 1, and General Superintendent (Passenger Commercial) in August of that year. Mr. Ashton Davies became Passenger Manager in 1931, and was selected to fill the then newly-created post of Chief Commercial Manager in July, 1932. He was awarded the Institute of Transport Railway (Operating) Gold Medal in 1930, and was elected Chairman of the Railway Clearing House, Coaching Traffic Superintendents' and Goods Managers' Conferences for the year 1934. He had twice previously held the penultimate office, during 1927 and 1930.

Elliott [*& Fry*

Mr. Ashton Davies, O.B.E.

Appointed Acting Vice-President (Railway Traffic, Operating and Commercial), L.M.S.R.

Sir William E. Dudley, Director of the Manchester Ship Canal Company, left estate valued at £15,241 (£14,584 net).

Overseas Railway Officers in England

The Hon. Thomas Dalton, Minister of Transport, Tasmania.

Mr. H. B. Emley, General Manager, Sudan Railways.

Mr. W. B. Hudson, Comptroller of Stores, New South Wales Government Railways.

Mr. L. F. Roach, Assistant C.M.E., Nyasaland Railways.

Mr. W. A. Hewitt, District Traffic Superintendent, Gonda, Bengal & North Western Railway.

Mr. H. C. Towers, a Senior Signal Engineer, Bombay, Baroda & Central India Railway.

It is with regret that we learn of the death of Sir John Snell, a former Chairman of the Electricity Commission, at the age of 68. The death occurred in London on July 6.

We regret to record the death, on July 1, of Mr. William Morris Mordley, who was President of the Institution of Electrical Engineers in 1908-9.

Captain R. N. Stuart, V.C., has been appointed General Manager, Canadian Pacific Steamships, Limited, in London, as from July 1. He has succeeded Captain R. G. Latta who retired under the age limit on June 30. Capt. Stuart was until recently General Superintendent at Montreal.

The directors of the Anchor Cable Co. Ltd. have appointed Mr. William Greame Hendrey, M.I.E.E., as a director of the company.

Colonel H. Pope, V.D., C.B., Commissioner of Railways in Western Australia from 1919 to 1928, whose death on May 13 we recorded last week, was appointed Acting Commissioner of Railways in September, 1919, in succession to Mr. J. T. Short, and six months later was confirmed in office. At the conclusion of his five years' term he was re-appointed for another five years, but in 1928, with two years of his appointment still to run, he asked to be allowed to resign on account of failing health. The years following the war were difficult ones in railway administration, but Colonel Pope's sojourn in office was so successful that from a deficit in 1919 of £359,794, a surplus of £190,565 was shown in 1925, while a surplus of £26,671 was disclosed for

the year ended June 30, 1928. Colonel Pope was a distinguished military commander during the Great War.

Mr. T. E. Argile, whose appointment as Acting Chief Commercial Manager in place of Mr. Ashton Davies is announced above, entered the Midland Railway Service at Derby in 1896. After spending some time in the Goods and General Manager's offices, he went to Leicester to obtain station experience. In due course he returned to Derby as Private Secretary to the then Chief Goods Manager, the late Mr. Adie, afterwards being transferred to general inspector's work in the Derby District. In 1910, Mr. Argile was selected to undertake general station revision work all over the late Midland system. In 1915 he was appointed Assistant to the Outdoor Goods Manager, shortly afterwards going to Swansea as South Wales Traffic Superintendent. In 1919 he transferred to Leeds as District Goods Manager, and in 1923 became Assistant to the Chief General Superintendent of the L.M.S.R. for goods operating work. In May, 1925, Mr. Argile was appointed District Goods Manager at Leeds to amalgamate the three constituent companies' districts into one district, becoming District Goods Manager at Liverpool in November of the same year. In January, 1928, he was appointed Goods Manager, Northern Division, in succession to Mr. E. H. Davies. He was appointed Assistant Chief Goods Manager, Euston, L.M.S.R., in 1931.

Mr. F. A. Pope, who, as announced above, has been appointed to the new position of Superintendent of Operation, London Midland & Scottish Railway, was educated at Leys School and joined the L.N.W.R. in 1909. During the war he served in France from 1914 to 1916 and in the Salonica Force until 1919, attaining the rank of Major, which he now retains in the Reserve of Officers. He was mentioned in despatches and was awarded the Greek Order of Merit and the White Eagle of Serbia. Mr. Pope was a member of the Inter-Allied Food and Transport Commission in reoccupied areas, and from 1919 to 1921 was on the staff of the Ministry of Transport. He returned to L.N.W.R. service in 1921, and from that date until 1925 served in the General Manager's Office, first of the L.N.W.R. and then of the L.M.S.R. In the latter year he was appointed Divisional Superintendent of the Nigerian Railway in connection with the reorganisation on the divisional system, and subsequently acted as Superintendent of the Line for periods in 1927 and 1929. He returned to the L.M.S.R. in the spring of 1933. He went out to India again in October of that year, and the same committee, under his chairmanship, prepared a second report reviewing progress since the first report was issued, and making additional suggestions for increasing efficiency and effecting economy. On his return from India in 1934, Mr. Pope was appointed General Assistant, Chief Operating Manager's Department, L.M.S.R., the position from which he is now promoted to be Superintendent of Operation.

Mr. L. V. Warhurst retired from his position as District Engineer, Sheffield, L.N.E.R., on June 15, after holding that position since 1904. The district is extensive, and covers upwards of 300 geographical miles in the industrial areas of Yorkshire, Lincolnshire, Derbyshire, and Nottinghamshire.

Mr. T. E. Argile

Appointed Acting Chief Commercial Manager, London Midland & Scottish Railway

Elliott] *[& Fry*

Mr. F. A. Pope

Appointed Superintendent of Operation, London Midland & Scottish Railway

Mr. Warhurst joined the former Manchester Sheffield & Lincolnshire Railway as an engineering pupil in 1890 and subsequently held the position of Chief Assistant to the Guide Bridge District Engineer; later he was appointed Assistant Docks Engineer at Grimsby. Mr. Warhurst is succeeded at Sheffield by Mr. J. B. Dawson, who has been a valued member of his staff for a number of years. Mr. Warhurst was educated at the Manchester Grammar School and subsequently at Owens College, which later became the Manchester University.

Mr. L. V. Warhurst
District Engineer, Sheffield, L.N.E.R. 1904-38

Mr. J. B. Dawson
Appointed District Engineer, Sheffield, L.N.E.R.

Mr. James Bridger
Appointed Stationmaster, Victoria, Southern Railway

Mr. J. B. Dawson, whose appointment to succeed Mr. L. V. Warhurst as District Engineer, Sheffield, L.N.E.R., was recorded in our issue of June 17, entered the service of the former Great Central Railway in 1911, in the Drawing Office of the Chief Engineer, London. He was employed there for three years in the Parliamentary, New Works, and Maintenance offices. He was transferred in 1914 to the office of the District Engineer, Sheffield, where (except for an absence of nearly five years on active service from 1914 to 1919) he has since been employed. On his return in 1919 and for the next eight years he was principally employed on the preparation of schemes for, and the supervision of, new and reconstruction works in the district. In 1927 Mr. Dawson was appointed Senior Assistant in charge of the technical staff, and in 1931 Chief Assistant, which position he occupied until his present promotion.

Mr. James Bridger, whose appointment as Stationmaster, Victoria, Southern Railway, was recorded in our issue of June 17, entered the service of the former London Brighton & South Coast Railway in August, 1904, as a telegraph learner at London Bridge, and afterwards served as a signal lad in several of the signal boxes in the London Area. In 1907 he was appointed Clerk to the Chief Goods Inspector at East Croydon, and in 1910 was transferred to the Special Traffic Section in the office of the Superintendent of the Line at London Bridge. At the outbreak of the war, Mr. Bridger was transferred to the Military Section for dealing with troops and munition trains for overseas. From 1916 he served in France in the Royal Engineers as Sapper, and attained the rank of Warrant Officer Class 1; he was also awarded the Distinguished Conduct Medal. On return to civil duties in 1919, Mr. Bridger was transferred to the Freight Train Section, and on the amalgamation of the railways was appointed to a similar section in the London (East) Division of the railway at London Bridge. In June, 1927, he was appointed Assistant Stationmaster at Victoria, Southern Railway, and in July, 1928, Deputy Chief of Freight Train Section, Traffic Manager's Office, Waterloo. In April, 1928, Mr. Bridger was appointed Yard master at Norwood marshalling yard and Selhurst depot. He was appointed Stationmaster at Guildford in 1935, also taking charge of Wanborough, Worplesden, and London Road stations.

Group of members of the Permanent Way Institution Convention in Germany taken on the steps of Cologne Cathedral last week. Mr. R. Carpmael, Chief Engineer, G.W.R., the President, and Mr. W. K. Wallace, Chief Engineer, L.M.S.R., Past-President, may be recognised *(see article on page 81)*

The Flying Scotsman Trains of 1888 and 1938

Demonstration run from King's Cross on Thursday, June 30

(*See illustration on pages* 69–71)

To afford a comparison between the Flying Scotsman train of 1888 and that of 1938, and also to celebrate the jubilee Railway Race to Edinburgh in the former year, the L.N.E.R. last week assembled a train composed of the type of stock used in 1888 on the East Coast Anglo-Scottish services. The train, which was hauled by engine No. 1 of the former G.N.R., a Stirling 8-ft. single driver built at Doncaster in 1870, consisted of seven six-wheeled coaches, and on Thursday of last week a party of guests travelled in it from King's Cross to Stevenage, a distance of 28½ miles, where they changed into the Flying Scotsman of 1938, which was drawn up at the adjacent platform. This train consisted of the new rolling stock recently built at the company's works at Doncaster, of which illustrated particulars appear on pages 64-68 of this issue. The " period " train subsequently returned from Stevenage to King's Cross, after being photographed outside the station alongside the 1938 Flying Scotsman hauled by " A4 " streamlined Pacific No. 4498, *Sir Nigel Gresley*, built at Doncaster in 1937.

The journey was then continued non-stop to Grantham, and thence to Barkston junction, where the engine was reversed by means of the triangular track at that point, leaving again at 4.47 p.m. on the return to King's Cross, where it was due to arrive at 6.49 p.m.

The very marked contrast between the trains of 1888 and the new one, which went into service between London and Edinburgh on July 4, could not by any other means have been so forcibly demonstrated. Although not uncomfortable to ride in, the earlier train, with its absence of restaurant and lavatory accommodation left, according to modern standards, a very great deal to be desired, and by comparison, the modern train might rightly be characterised as not only luxurious, but even sumptuous in its appointments and in the smoothness of running at very considerably increased speeds. The exceptionally steady running of the new rolling stock, together with the high standard of comfort and convenience embodied in the construction of the coaches, were favourably commented upon by the guests. Tea was served on the return journey in the restaurant car, and also in the buffet car now attached to the train.

The new train sets will be used on the non-stop Sunday Scotsman, which, beginning on July 10, will share with the Flying Scotsman the distinction of performing the world's record non-stop run of 392¾ miles in seven hours in each direction between King's Cross and Edinburgh. Thus, during the summer of 1938, the world's record run will be made for the first time in history on seven days in each week. Details of the speeds and general performances of the old and new trains on June 30, compiled by Mr. Cecil J. Allen, are tabulated alongside.

The most lively interest was taken by the general public and by railwaymen, not only at King's Cross, but at numerous points along the route, in the passing of the old engine and its train of six-wheeled coaches. It may be of interest to recall some particulars concerning the Stirling single-driver engine No. 1, which—if not actually the first—was among the first of the engines of this class built at Doncaster between the years 1870 and 1895. These engines achieved a wide fame for speed and reliability. The simplicity of the design and freedom of running were marked characteristics, and they were capable of hauling trains within their capacity on a coal consumption ranging from 22·6 to 30 lb. a mile.

The following table gives the principal dimensions of the engine of 1870 and that of 1938:—

Engine	1888 4-2-2 No. 1	1938 4-6-2 No. 4498
Cylinders, diameter	(2) 18 in.	(3) 18½ in.
,, stroke	28 in.	26 in.
Driving wheels, diameter ...	8 ft. 1 in.	6 ft. 8 in.
Boiler barrel—		
Length	11 ft. 5 in.	18 ft.
Outside diameter	3 ft. 10½ in.	(front) 5 ft. 9½ in. (rear) 6 ft. 5 in.
Centre above rail	7 ft. 1 in.	9 ft. 4½ in.
Heating surface—		
Tubes	1,043 sq. ft.	2,345 sq. ft.
Firebox	122 ,,	231 ,,
Superheater	— ,,	749 ,,
Total	1,165 sq. ft.	3,325 sq. ft.
Working pressure, per sq. in.	140 lb.	250 lb.
Tractive effort (at 85 per cent.)	11,245 lb.	35,455 lb.
Adhesion weight	15 tons	66 tons
Engine weight (working order)	38½ tons	103 tons
Tender, water capacity ...	2,700 gal.	5,000 gal.
,, coal capacity	3½ tons	8 tons
Tender weight (full)	26½ tons	62½ tons
Weight of engine and tender	65 tons	165½ tons

On pages 66 to 69 will be found diagrammatic drawings of the two trains. The tare weight of the 1888 train was 90 tons, and the seating accommodation 80 first and 90 third class. The train of 1938 is composed of 12 to 14 vehicles, according to the season of the year, and with the larger number its tare weight is 503 tons; accommodation is provided for 60 first and 258 third class passengers.

G.N.R. locomotive No. 1 is one of the permanent exhibits at the Railway Museum, York, and was overhauled at Doncaster works recently for the purposes of the demonstration runs.

As regards the demonstration runs of the old and the new trains, the Stirling single-driver made a vigorous exit from King's Cross up the 1 in 105—110 gradient to Holloway, and despite some slipping at the start, was through Finsbury Park, 2·5 miles, in 6 min. 15 sec. Along the level stretch to Wood Green (5·0 miles, passed in 9 min. 12 sec.) a speed of 57½ m.p.h. was developed, and the engine then ran well up the long 1 in 200 to Potter's Bar, falling first to 45 m.p.h. after New Southgate, but then recovering gradually to 49½ m.p.h. before the summit of the incline was breasted. New Barnet, 9·2 miles, was passed in 14 min. 16 sec., and Potter's Bar, 12·7 miles, in 18 min. 38 sec. A continuance of the same effort would have taken the 95-ton trainload through Hatfield in 24 min. or so, but it was not deemed advisable to " extend " the engine, after its lengthy sojourn in the museum, and steam was therefore shut off for some distance, after which the running to Stevenage was devoid of comment. On the return journey No. 1 attained a maximum speed of 65 m.p.h. Such speeds are, of course, well below those attained by the Stirling singles in the heyday of their fame, when loads of over 200 tons were also not at all unusual. On this run No. 1 was in charge of Driver Austwick, of Doncaster.

At Stevenage the passengers transferred to the new Flying Scotsman train, made up to its complete formation of 14 coaches, and appropriately headed by streamlined " A4 " locomotive No. 4498, *Sir Nigel Gresley*.

TRIAL RUN OF NEW FLYING SCOTSMAN TRAIN
Stevenage to Grantham

Engine " A4 " 4-6-2 No. 4498, *Sir Nigel Gresley*.
Load: 14 coaches, 503 tons tare, 510 tons full.

Distance Miles		Times Min. sec.	Speeds M.p.h.
0·0	STEVENAGE ...	0 00	—
3·3	HITCHIN	5 37	—
7·1	Three Counties ...	8 40	80½
8·4	Arlesey	9 38	82–80½
12·5	Biggleswade ...	12 36	85
15·5	Sandy	14 40	88
18·9	Tempsford	16 59	90
23·1	St. Neots	20 00	82
27·4	Offord	23 19	*69
30·3	HUNTINGDON ...	25 52	70½
33·4	*Milepost* 62 ...	28 42	61½
34·9	Abbotts Ripton ...	30 07	—
40·8	Holme	34 21	90
44·0	Yaxley	36 44	—
46·4	*Fletton Junc.* ...	38 41	71½
47·8	PETERBOROUGH	40 53	*24
50·9	*Werrington Junc.* ...	45 38	—
53·3	*Helpston*	48 03	—
56·2	Tallington	50 50	65
60·0	ESSENDINE ...	54 30	—
63·6	Little Bytham ...	58 06	—
68·5	Corby	63 23	53–57½
71·5	*Stoke*	66 42	53
73·4	Great Ponton ...	68 57	—
76·9	GRANTHAM ...	72 36	—

* Service slack

With a gross load of 510 tons behind the tender this engine, driven by Sheen of King's Cross shed, made a very fine run to Grantham, of which the details are set out in the annexed table. It will be noted that the 46·4 miles from Stevenage to Fletton were covered in 38 min. 41 sec. from the start, with maxima of 90 m.p.h. both near Tempsford (on but little easier than level track) and before Holme; the average speed was 84·7 m.p.h. over the 16·0 miles from Three Counties to St. Neots, and 78·2 m.p.h. over the 43·1 miles from Hitchin to Fletton, including a slack to 69 m.p.h. at Offord, and the 3 miles at 1 in 200 up after Huntingdon.

Fine uphill work was also done after the severe service slack through Peterborough; at the top of the 4½ miles at 1 in 200 before Corby the minimum was 53 m.p.h., and up the 3 miles at 1 in 178 from Corby to Stoke speed fell only from 57½ to 53 m.p.h., while the entire 15·3 miles of climbing from Tallington to Stoke summit were completed at an average of 57·8 m.p.h. Thus the 76·9 miles from Stevenage to Grantham, Peterborough slack included, were run in 72 min. 36 sec., at a start-to-stop average of 63·6 m.p.h.

On the return trip high-speed running was confined to the downhill stretch from Stoke to Werrington; between Essendine and Tallington a maximum of 93 m.p.h. was attained, the average being 90·6 m.p.h. over the 3·6 miles from Little Bytham to Essendine, and 90·0 over the 3·8 miles thence to Tallington, while from Corby to Tallington the average was 86·0 m.p.h. for 12·3 miles. The 29·1 miles from passing Grantham to Peterborough were run in 26 min. 39 sec., and the 17·5 miles on to Huntingdon in 17 min. 42 sec., but after that signal checks compelled easier running for the rest of the journey to King's Cross.

CONTROL GEAR FOR THE L.P.T.B.—Examples of the 1,066 control equipments in production for the new rolling stock of the L.P.T.B. (described in our July 1 issue) drew a good deal of attention when members of the Institution of Electrical Engineers, on July 6, visited the Rugby works of the British Thomson-Houston Co. Ltd. These equipments, which are of the pneumatically operated type and designed for mounting beneath the floor of the new trains, were seen in all stages of manufacture, and their assembly occupies almost the whole of the ground floor of the control factory. Elsewhere, the welded frames to carry the assemblies were seen in process of fabrication. The design is a striking example of compactness, though it permits ready accessibility. It represents one of the factors by which the L.P.T.B. is planning to increase the availability of accommodation for passengers during rush hours, because by locating the control gear below the floor, it releases space otherwise occupied thereby.

A New L.N.E.R. Speed Record

The streamlined 4-6-2 locomotive "Mallard," with Kylchap exhaust and double chimney, averages 120 m.p.h. for 5 miles and touches 125 m.p.h. with a 240-ton test train

A very remarkable speed record was set up by the London & North Eastern Railway on Sunday last, July 3, on the falling gradient from Stoke summit towards Peterborough. The occasion was one of some high-speed brake trials, for which three twin articulated coaches out of the spare Coronation set were used, together with the dynamometer car, seven vehicles in all, weighing 236½ tons tare, and 240 tons with the officials and staff concerned in the tests. The engine was "A4" class streamlined Pacific No. 4468, *Mallard*, which is one of the three locomotives of this series that are equipped with the Kylchap exhaust arrangements, including double blast-pipe and chimney. In the course of a series of runs between Peterborough and Grantham, it was decided to ascertain the maximum speed of which the engine was capable with this load.

On the run in question, the critical length of which is shown in tabular form, the engine, after passing through Grantham station at a reduced speed of 24 m.p.h. in consequence of permanent way operations in progress, was opened up to 40 per cent. cut-off. In 2½ miles this produced an acceleration up 1 in 200 to 59¾ m.p.h. From the 103 to the 101½ milepost cut-off was reduced to 30 per cent., but at Great Ponton station (102 miles), the engine was again opened out to 40 per cent., and on the continuance of the 1 in 200 ascent speed rose further in 1½ miles from 66 m.p.h. to 74½ m.p.h. at Stoke summit. On the succeeding descent, with the engine still cutting off at 40 per cent., the speed increased in 6 miles from 74½ to 116 m.p.h. From 94½ to 93 miles the driver tried 45 per cent. cut-off, and secured an increase to 119 m.p.h., but then reverted to 40 per cent. at milepost 93, with speed still steadily rising, until it crossed the 120 m.p.h. mark between posts 92¾ and 92½, and remained above the 120 m.p.h. level until steam was shut off at the 89¾ milepost. The absolute

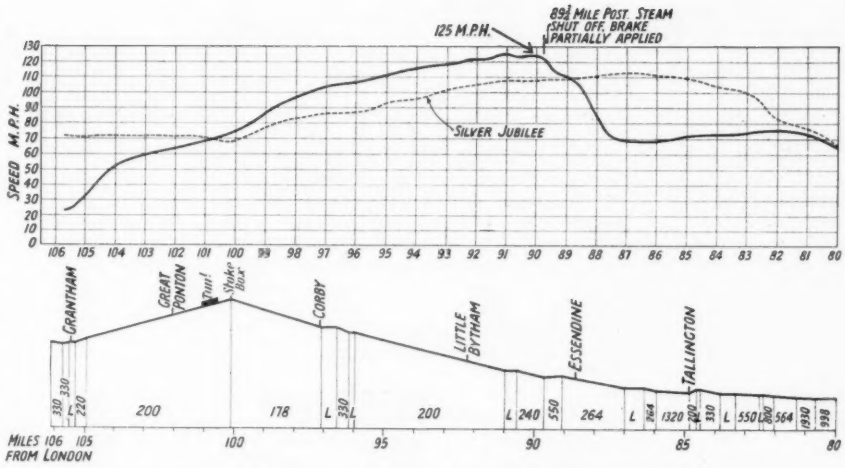
L.N.E.R. TEST RUN WITH CORONATION TRAIN, JULY 3, 1938
Engine: Streamlined 4-6-2 No. 4468, *Mallard*, Class "A4"
Driver J. Duddington, Fireman T. H. Bray (Doncaster Shed)
Load, 7 coaches, 236½ tons tare, 240 tons gross

Stations	Mileposts	Times (p.m.)	Speeds	Cut-off
		Hr. min. sec.	M.p.h.	Per cent.
GRANTHAM	105½	4 24 19	24*	40
Milepost	105	4 25 13	32	,,
,, ...	104	4 26 32	52¼	,,
,, ...	103	4 27 36½	59¾	30
Great Ponton .. .	102	4 28 35½	63½	,,
Milepost	101½	—	—	40
,, ...	101	4 29 30	69	,,
Stoke Box (10·1 miles)	—	4 30 16	—	,,
Milepost	100	4 30 20½	74½	,,
,, ...	99	4 31 05	87½	,,
,, ...	98	4 31 44½	96½	,,
Corby (97·1 miles) ..	—	4 32 17	—	,,
Milepost	97	4 32 20½	104	,,
,, ...	96	4 32 54½	107	,,
,, ...	95	4 33 27½	111½	,,
,, ...	94¼	—	—	45
,, ...	94	4 33 59½	116	,,
,, ...	93	4 34 30	119	40
,, ...	92¾	—	119¼	,,
,, ...	92½	—	120¾	,,
Little Bytham	92¼	4 34 52½	122¼	,,
Milepost	92	4 35 00	122½	,,
,, ...	91¾	—	122¼	,,
,, ...	91½	—	123	,,
,, ...	91¼	—	124¼	,,
,, ...	91	4 35 29	124½	,,
,, ...	90¾	—	123½	,,
,, ...	90½	—	124	,,
,, ...	90¼	—	125	,,
,, ...	90	4 35 58½	124¼	,,
,, ...	89¾	—	123	Steam off
,, ...	89½	—	116	Brakes
,, ...	89¼	—	113	,,
,, ...	89	4 36 29	110	,,
ESSENDINE (88·65 m.)	—	4 36 40	107½	,,
Milepost	88¼	—	95	,,

Note.—Regulator full open throughout the test. The speeds in the speed column are the precise speeds on passing each of the points indicated. The changes in cut off took place at the station or milepost indicated on the same line * Permanent way slack

maximum reached was 125 m.p.h. at milepost 90¼, and it will be noticed from the diagram reproduced that speed ranged between 123 and 125 for nearly two miles, despite the fact that part of this is level, and part on an easing of the grade from 1 in 200 to 1 in 240. The reduction of speed from milepost 89¾ was due to the slight curve through Essendine, complicated with junctions, which it was not thought desirable to take at such exceptionally high speed; and the opportunity was also taken of making a brake test at 120 m.p.h.

The table shows the precise speed at each quarter-mile of the critical length, calculated from the dynamometer record, which gives extremely accurate figures, together with the milepost times in seconds. The average speed over the 9 miles between posts 98 and 89 was precisely 100 m.p.h.; between posts 94 and 89, 5 miles were covered in 2 min. 29½ sec., at an average of 120·4 m.p.h.; and individual averages were 120·0 m.p.h. from post 93 to 92, 124·1 m.p.h. from 92 to 91, and 122·0 m.p.h. from 91 to 90. Actually the speed was over 120 m.p.h. for about three miles, and as the boiler was finding steam steadily for the heavy demand created by 40 per cent. cut-off with full regulator, there seems no reason why this speed should not have been continued down the 1 in 264 beyond Essendine. In any event, the record clearly shows the maximum to have been no merely momentary peak, but maintained at an even figure for a greater distance than any of the previous records, apart from the 43 miles continuously at 100 m.p.h. average of *Silver Link* in the Silver Jubilee trial of September 27, 1935. The engine was in charge of Driver J. Duddington and Fireman T. H. Bray, Doncaster, where *Mallard* is stationed, with Inspector J. Jenkins, of London.



Curves showing speed of test run of "Mallard" with 240 tons on July 3, 1938, compared with previous record of "Silver Link" with 270 tons on August 27, 1936

The abrupt drop in the speed curve of "Mallard's" run is due to the brake test having been made from the 89¾ mile post onwards

RAILWAY AND OTHER REPORTS

International Sleeping Car Share Trust Limited.—The report to May 31 last shows receipts from the company's holding in the International Sleeping Car Company (which paid a dividend of 4 per cent. on the ordinary shares and a dividend of 5 per cent. on the preference shares for the year 1937 together with arrears of preference dividend for the previous six years) of £20,473, and a net profit of £13,527 after providing for income tax and N.D.C., against a net loss of £232 for the previous year. After deducting the debit balance as at May 31, 1937, of £2,591, there is a credit balance to be carried forward of £10,936.

Great Southern of Spain Railway Co. Ltd.—Taking into account only revenue and expenditure in London, including first mortgage debenture interest accrued but payment postponed under the 1934 moratorium scheme, the loss for the year 1937 is £11,763, which increases the accumulated debit balance to £146,531, so far as it is ascertainable. The company has been without any direct news as to the local situation since the last report. On October 21, 1937, a decree was issued in Valencia to incorporate all the railways, the working of which, under previous decrees, had provisionally been taken over by the State, into a single national railway system, to be operated by a national railway council, and providing for the transference to the State of the assets and liabilities of those undertakings. The company will formulate its claim against the Spanish Government when the situation permits. It is proposed to postpone payment of the first mortgage debenture stock interest for a further period under a scheme of arrangement, which will be submitted to meetings to be called for the purpose.

Entre Rios Railways Co. Ltd.—The directors have decided to pay at the end of July a further six months' arrears of interest on the 4 per cent. debenture stock of the company, together with the 5 per cent. per annum interest on such arrears as provided for under the moratorium scheme, the total amounting to £2 4s. 8d. per cent., less income tax.

Nyasaland Railways Limited.—Gross receipts from the working of the railway, including the Northern Extension and the Lake Service, for the year 1937 were £161,466, against £138,941 for 1936. Working expenses rose from £95,502 to £101,642, leaving net receipts of £59,824, against £43,439. Working expenses, including a provision for renewals, were 62·94 per cent. of the gross receipts, as against 68·73 per cent. in 1936. Excluding renewals, the operating ratio for 1937 was 45·84 per cent., compared with 54·29 per cent. for 1936. After applying £18,588 to taxation reserve there was a surplus on the working of the Northern Extension of £4,050, which was transferred to reserve for renewals. The interest receivable on the debentures of the Central Africa Railway Co. Ltd. (£33,617) and on the income bonds of the Trans-Zambesia Railway Co. Ltd. (£5,597) together make the amount payable as interest on the 5 per cent. bridge debenture stock of the Nyasaland Company.

Midland Bank Limited.—The directors announce an interim dividend for the half-year ended June 30 last at the rate of 16 per cent. per annum less income tax, payable on July 15 next. The same rate of dividend was declared a year ago.

G. D. Peters & Co. Ltd.—An interim dividend of 10 per cent., less tax, in respect of the half-year to June 30, 1938, is being paid to holders registered on July 4. Under the capital reorganisation scheme sanctioned on July 30, 1937, all shares now rank equally. A dividend at the rate of 15 per cent. per annum for the five months ended December 31 last was paid in April, 1938.

North Glamorgan Wagon Co. Ltd.—Trading profit for the year ended March 31, 1938, was £2,117, to which should be added £12,736 brought forward, making a disposable balance of £14,853. The dividend recommended is 5 per cent. for the year, leaving £13,742 to be carried forward. It is stated in the report that the recovery realised in the wagon hiring market has been offset by the additional repair costs consequent upon the expediting of the company's G.R. plating programme (in order to comply with the regulations issued by the Railway Clearing House), and the heavier prices of materials.

Southern Railway Main Line Electrification

Official Opening to Arundel, Littlehampton, Bognor Regis, Chichester and District

The official opening of the Southern Railway's West Sussex and Coastal Electrification Extension (which was fully described in the *Electric Traction Supplement of* THE RAILWAY GAZETTE for June 24) took place on Thursday, June 30, when Mr. R. Holland-Martin, Chairman, and Mr. Gilbert Szlumper, General Manager, accompanied by the directors, chief officers, and a number of guests and press representatives, travelled by special train, first to Littlehampton, where there was a reception by the Urban District Council, and then to Bognor Regis, where there was a reception by the Urban District Council, followed by luncheon at the Bognor Regis Pavilion.

Those present included: The Duke of Norfolk; Messrs. E. P. Banks, Town Clerk of Chichester; L. B. Beresford, Clerk to the Littlehampton U.D.C.; W. C. Birkett, Mayor of Worthing; A. J. Boyd, Managing Director, Metropolitan-Cammell Carriage & Wagon Co. Ltd.; Lieut.-Col. P. M. Brooke-Hitching; Messrs. B. J. Bunbury, Land Agent to the Duke of Norfolk; J. E. Calverley, Manager, Traction Department, English Electric Co. Ltd.; J. H. Chillman; Count J. A. de Kerdrel, London Manager, French Railways; Messrs. G. R. Glegg, Mayor of Sutton; A. Greaves, Mayor of Arundel; G. H. Griffith, General Manager, Pullman Car Company; Herbert A. E. Hay, Town Clerk of Arundel; R. J. M. Inglis, Engineer, Southern Area, L.N.E.R.; W. J. Jones, President of Arundel Chamber of Commerce; J. A. Kay, Editor, THE RAILWAY GAZETTE; J. M. Kennedy, Electricity Commissioner; G. L. Kirkpatrick, Managing Director, Bruce Peebles & Co. Ltd.; A. F. Lower, Chairman of Horsham U.D.C.; Councillor T. W. Marshall, Chairman of the Bognor Regis U.D.C.; Mr. R. E. L. Maunsell, formerly Chief Mechanical Engineer, Southern Rly.; Lieut.-Col. A. H. L. Mount, Chief Inspecting Officer Railways, Ministry of Transport; Messrs. W. H. Napper, Deputy Mayor of Chichester; W. R. Nowell, Traction Erection Manager, English Electric Co. Ltd.; Y. Overgaard, Manager, Railway Dept., Asea Electric Limited; J. Newman Palmer, President of Chichester Chamber of Commerce; B. N. Piggott, Past President of Horsham Chamber of Trade; Brian Reed, *Electric Traction Supplement*, THE RAILWAY GAZETTE; A. B. Raworth, General Electric Co. Ltd.; H. T. Rice, Director, English Electric Co. Ltd., V. A. M. Robertson, Chief Engineer, L.P.T.B. H. W. Townsend, Chairman of Littlehampton U.D.C.; Brig.-Gen. Sir Arthur Williams, Vice-Chairman of Littlehampton Harbour Board.

Southern Railway Directors: Mr. R. Holland-Martin, Chairman; Mr. E. Gore-Browne, Deputy Chairman; Sir George L. Courthope, Sir Francis H. Dent, Rt. Hon. Lord Ebbisham, Mr. Charles Sheath, Sir John Thornycroft, and Sir Herbert Walker.

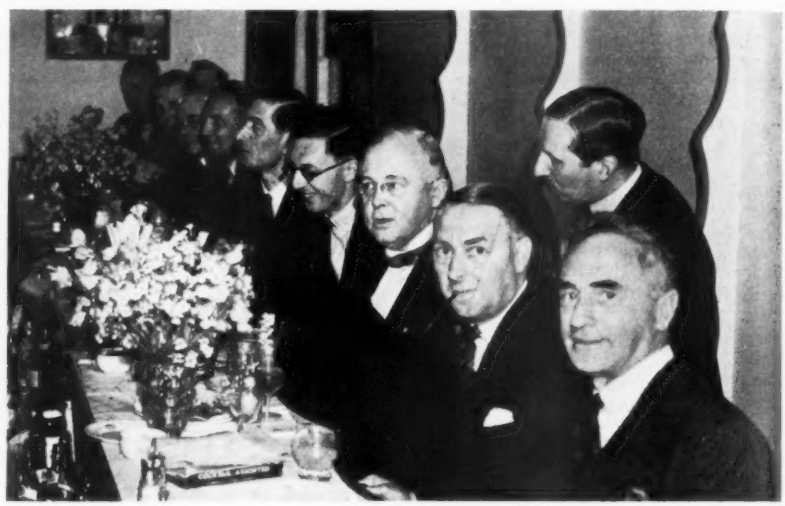
Southern Railway Officers: Messrs. O. V. Bulleid, Chief Mechanical Engineer; A. B. Chester, Central Divisional Engineer; Major L. F. S. Dawes, Secretary; Messrs. G. Ellson, Chief Engineer; W. J. England, Assistant Superintendent of Operation; G. H. Hare Dean, South Coast Representative; C. V. Hill, Southern Divisional Engineer; Herbert Jones, Electrical Engineer; C. J. C. Latham, London Central Divisional Superintendent; E. J. Missenden, Traffic Manager; W. C. Moore, Chief Assistant to Electrical Engineer; W. M. Perts, Commercial Superintendent; Col. H. C. Prescott, Chief of Police; Messrs. A. Raworth, Electrical Engineer for New Works; R. M. T. Richards, Assistant Traffic Manager; W. J. Shorter, Assistant for Development of Traffic; S. W. Smart, Assistant for Train Services; Gilbert S. Szlumper, General Manager; H. E. O. Wheeler, Superintendent of Operation.

Mr. T. W. Marshall, chairman of the Bognor Regis Urban District Council, presided at the luncheon, and in proposing "Success to the Southern Railway Electrification," said he did so with a certainty that the electrification of the line would be productive of definite advantages to Bognor Regis as well as to the other towns on the line. Good results could be anticipated having regard to the success of other electrification schemes which the Southern Railway had undertaken. Recalling requests the council had made for a more speedy service between Bognor and London, he expressed the council's appreciation of the facilities offered by the new timetables. There would be some who would regret the passing of the steam train, but he thought they would soon take to their hearts the "slick modernity of the electric train."

Mr. R. Holland-Martin, Chairman of the Southern Railway, in responding, said they were celebrating that day the fourth stage of the electrification scheme begun by Sir Herbert Walker. He thought it was going to do a great deal of good to all the towns in that part of Sussex. The service they were going to give was a far better one than they had yet had. Under the new scheme there would be 16 London—Bognor Regis through services, 18 Littlehampton, 14 Chichester, and 17 Arundel services. That meant that they would be able to carry many more people from and to London. Continuing, he said Sussex was one of the most beautiful counties in the country, and he hoped that each town and village would realise that the great asset of the county was its beauty, and that they would do everything in their power to maintain it, as it was a most precious heritage.

Mr. Gilbert Szlumper proposed the toast of "Our Guests," and hoped it would soon be necessary for them to extend the timetables. They, on the Southern Railway, knew the advantage of electrification. They had been sometimes blamed for spoiling the countryside; but the Southern Railway never did that! If only the local authorities regulated the type of houses which were put up, there was no reason why the countryside should be spoilt. Unfortunately there were places he could name which looked more like a western mining camp than a civilised town. Continuing, he advised the people of Bognor to look to their hotels, as there was no magnet so strong as a selection of good hotels at reasonable prices. He was not attempting to criticise, but if any improvement could be made, their energy in that direction would be well spent.

The Duke of Norfolk, responding, said that he disliked travel by car, much preferring to travel by train; but hitherto, unfortunately, he had found it quicker to travel between Arundel and London by road; and he trusted that would not be the case in future. He hoped that the railway company would consider the possibility of putting on at least one extra fast train in the morning and evening; and one to London after dinner on Sunday.



Group in one of the new Southern Railway buffet cars

Including Mr. E. J. Missenden, Traffic Manager, Mr. C. Grasemann, Public Relations and Advertising Officer, and Mr. C. J. C. Latham, London (Central) Divisional Superintendent

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MODEL ENGINEER EXHIBITION.—The Model Engineer Exhibition for 1938 is to be held at the Royal Horticultural Hall, Westminster, London, from September 15 to 24, inclusive, and will be open daily from 11 a.m. to 9.30 p.m. The price of admission is 1s. 3d.

P.W.I. Summer Convention in Germany

(*See illustrations on pages* 72)

Last week we outlined the main features of the summer convention in Germany of the Permanent Way Institution which had begun on the previous Saturday, June 25. In order that the account of our representatives should reach London in time for publication, it was necessary for this to be despatched by air from Cologne in the early hours of Wednesday morning while the reception and dinner given by the Reichsbahn to the members of the convention was still in progress, and it remains now to record the concluding stages of the visit.

On Wednesday morning the party was conveyed from Cologne to Düsseldorf in Reichsbahn motorcoaches, and at the latter place a visit of inspection was paid to the new station. The actual station building is finished and impressed the visitors with its extent and completeness. Work is still proceeding on the platforms where a novel type of all-welded station roofing was seen. The principle upon which this platform roofing is designed was illustrated in Mr. Otto Bondy's article on "Welding Progress in 1937" on page 1076 of THE RAILWAY GAZETTE of June 3. The new power signalling was also inspected.

The visitors then proceeded, *via* Solingen, the German Sheffield, to the Müngsten railway bridge which crosses the Wupper valley at a height of 348 ft. and is the highest railway bridge in Germany. It has a total length of 1,657 ft., a centre arch of 560-ft. span, and was built between the years 1894 and 1897. The journey was continued through Remscheid, another centre of the steel industry, to the reservoir in the Eschbach valley, which is dammed immediately above the site of the new direct motor road now being constructed from Cologne to Berlin, and which supplies the town of Remscheid. Here lunch was served, after which the party returned to Cologne through picturesque hill country on a road roughly parallel to that of the new motor road, construction of which was seen at various points.

On Thursday the members were taken by motorcoach to the railway depot at Köln-Nippes where relaying work by a firm of contractors was in progress on the main line, and the whole elaborate cycle of events was viewed under normal working conditions. Attention was first directed to the mechanical track-lifting machine which, in one operation, grips and lifts a complete section of track and its sleepers. The section is then passed through the upper part of the machine (for which power is supplied by a diesel-electric set) and deposited on a flat wagon behind it which accommodates six such sections. The several flat wagons constituting the train may be linked by short movable sections of rail so that the stack of old track can be pulled forward by means of a rope hauled by the locomotive to the front part of the train, leaving the truck next to the track-lifting machine clear to receive a further load. The complete operation of lifting and transferring to the flat truck a 15-metre length of track was timed to occupy just over four minutes.

The ballast is then removed and, where necessary, the formation reshaped. After screening, the ballast is thrown back again and rolled in layers, with additional ballast as required, up to the level of the bottom of the sleepers. This is now standard practice when renewing main lines in Germany and allows for a minimum depth of about 1 ft. of ballast below the sleeper. The new rails are set on small jacks to exact level and true alignment, far enough apart to drop the sleepers between them, and with the positions of the sleepers marked on the rails. The sleepers, previously fitted with their soleplates, having been correctly placed, the rails are then slewed into position and fastened down with the standard GEO type of clip bolt fastening, and the whole is then firmly packed by pneumatic tampers. For the purposes of the demonstration a section of steel sleepers was also being placed so that the visitors could see the method of providing mounds of tamped ballast upon which to place them.

This method of relaying and renewing ballast requires complete possession of one track, and in the particular instance observed at Köln-Nippes, a 5-km. length had been given up to the contractor for 24 days, at the end of which time the renewed line would be ready for full-speed traffic. Meantime, facing crossovers had been laid for single-line working on the other track. The rate of renovation thus works out at approximately a mile a week.

Where complete possession is not obtainable similar renovation is undertaken by supporting the underside of the rails on specially prepared wooden blocks and packing, placed between adjacent sleepers where the ballast has been removed to the new formation level. Four spaces are then cleared out and refilled and the new ballast mechanically tamped. A distance of at least seven sleepers must be left between adjacent excavations, and the speed of the trains is reduced during these operations to 30 km.p.h. Some of the operations described above are shown in our illustrations.

Another item noted in connection with permanent way work was the compressed-air hooter for warning the men should several trains approach simultaneously and create noise or smoke sufficient to make the normally-used mouth trumpet doubtfully audible. Insulated joints and hopper ballast wagons and a weed-killing train were also demonstrated, as well as reconditioned fittings and steel sleepers (built up by welding good sections of worn sleepers) for use on secondary lines. The whole visit of inspection was one of outstanding interest to the members of the Permanent Way Institution.

The party entrained for London on Thursday evening just after 6 o'clock at Cologne station, and was given a rousing send-off by Dr.-Ing. Remy, President, Cologne Division of the Reichsbahn, Reichsbahnrat Herbert Haupt, Mr. W. F. Spree, Assistant General Agent in Cologne, Southern Railway, and others who had contributed to the success of a memorable convention. The special train, kindly provided by the Reichsbahn, departed to the strains of a railway band.

After the frontier had been crossed, restaurant cars were attached to the train and dinner was served between Hergenrath and Ostend. Although this was an informal meal, the President, Mr. Raymond Carpmael, took the opportunity of expressing the thanks of the whole party to Mr. H. Janes, Assistant Secretary of the P.W.I. and Secretary of the Convention Committee, to Herr Eddie G. Bossecker, the chief courier, and to the other couriers, for their untiring services both in making the needful preparations and also during the convention. Small tokens of appreciation were subsequently made to them.

(*Editorial comment on page* 48)

INTERNATIONAL ACETYLENE CONGRESS AT MUNICH IN 1939.—The Thirteenth International Acetylene Congress will be held in Munich from June 25 to July 1, 1939. The last three similar congresses were held at Zurich (1930), Rome (1934), and London (1936). The aims of the congresses are the advancement and study of all technical and economic questions connected with the production and applications of calcium carbide, acetylene, and oxygen, with special reference to oxy-acetylene welding.

NEW TYPES OF WAGONS, G.W.R.—Two new types of goods wagons have just been introduced on the Great Western Railway. The first is a ventilated covered wagon with slotted gauze-covered ends and sides, which ensure a free circulation of air reaching even the bottom layers of the load, but protecting it from dirt and dust. These wagons, of which 200 have been built, are used for tomatoes and all kinds of fruits and vegetables. The second is a shock-absorbing wagon of which the body, which is entirely self-contained, moves independently on an underframe fitted with special springs and buffers to absorb shocks. The wagon, the first of six, has been severely tested. Loaded with two tons of light, breakable goods, it was shunted 10 times into other wagons at varying speeds up to 14 m.p.h., 4 miles in excess of "collision" speed. In spite of this the contents suffered only minor damage.

Rhaetian Railway Anniversaries

(From our Swiss correspondent)

The Rhaetian Railway can celebrate this year a double anniversary. In May, 1888, the first sod was cut for the initial section of its system, from Landquart to Klosters, and on July 1, 1913, the present network was completed by the opening of the Bevers-Schuls line. The latter was electrically operated from the start. Apart from some 20 km. of the Federal line from Sargans and beyond to Chur, the Canton of Grisons (or Graubünden) is exclusively served by metre-gauge lines, viz., the Rhaetian Railway, with routes totalling 276·2 km.; the Bernina Railway (60·8 km.); the Chur-Arosa Railway (25·7 km.); and a 19-km. section of the Furka-Oberalp Railway, joining the Rhaetian at Disentis and forming part of the route of the Glacier Express from St. Moritz to Andermatt, Brigue, and Zermatt.

The development of the Rhaetian system is shown in the following table :—

Section	Date opened	Electrified
Landquart-Klosters	October 9, 1889	1921
Klosters-Davos ...	July 21, 1890	1920
Chur-Thusis ...	July 1, 1896	1921
Landquart-Chur ...	August 29, 1896	1921
Reichenau-Ilanz ...	June 1, 1903	1921
Reichenau-Trins		1921
Trins-Ilanz ...		1922
Thusis-Celerina ...	July 1, 1903	
Thusis-Bevers ...		1919
Celerina-St. Moritz	July 10, 1904	
Bevers-Celerina-St. Moritz ...		1913
Samaden-Pontresina	July 1, 1908	1913
Davos-Filisur ...	July 1, 1909	1919
Ilanz-Disentis ...	August 1, 1912	1922
Bevers-Schuls ...	July 1, 1913	1913

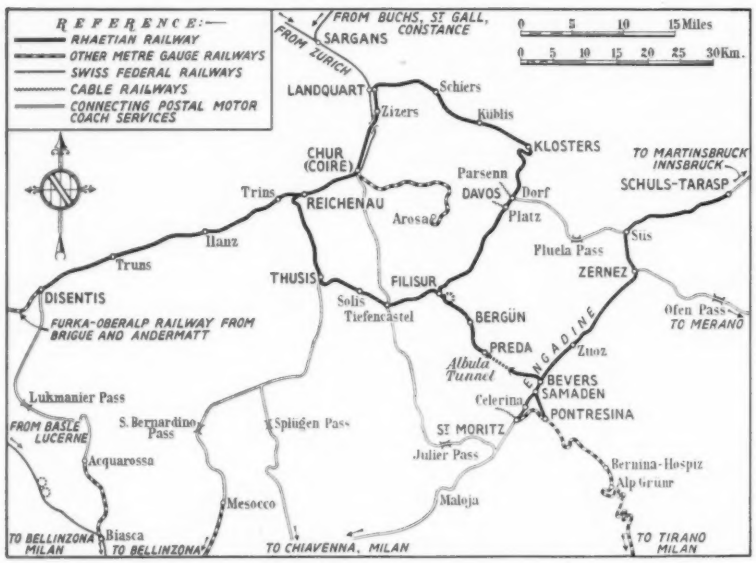
The more recent sections were built with easier gradients and curves, and whereas the pioneer line from Landquart to Davos has a maximum gradient of 4·5 per cent. and curves of 100 m. minimum radius, the figures for the Bevers-Schuls line are 2·5 per cent. and 160 m., respectively. Curves represent 110 km. of the total of 277 km. There are 82 tunnels on the system, the most notable of which is the Albula tunnel (5,864 m.), on the main line to the Engadine. Bridges and viaducts number 389 in all, 166 of which are over 10 m. in length, including several remarkable stone viaducts, such as the Solis (89 m. above river level and 164 m. long) and the Wiesen viaducts (88 m. high and 210 m. long). To avoid rack sections, spiral tunnels, and loops on the surface had to be constructed in order to overcome the considerable differences in altitude, and the section between Bergün and Preda (illustrated) is particularly noteworthy in this respect.

When electric traction was first introduced, the Rhaetian Railway had 47 steam locomotives, 28 of which were tank engines, including 12 of Mallet type; the heaviest 2-8-0 locomotives weighed 67 *tonnes* in working order. Coaching stock reflects the development of this progressive system, and bogie coaches have gradually replaced the older 4-wheeled vehicles. The types introduced in recent years for express trains have closed platforms and vestibule connections, and bear comparison with the best standard-gauge coaches. Dining cars are owned and staffed by the Mitropa Company.

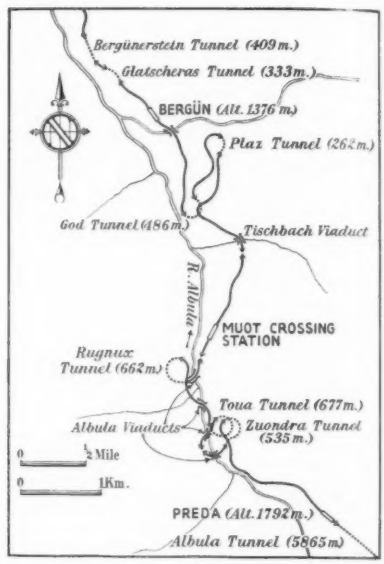
Electrification has been carried out on the single-phase system at 11,000 volts 16⅔ cycles. For the Engadine lines (St. Moritz and Pontresina-Schuls) a number of 1-B-1 and 1-D-1 electric locomotives were placed in service in 1913, but a more powerful design, of the C-C type, was introduced in 1921 and is used for the heaviest trains. At the present time, the Rhaetian Railway is following the latest practice by ordering some lightweight railcars and coaches, which should make for higher speeds as well as economy in operation.

Recent improvements on the Rhaetian system include the construction of a new section of line (with loop tunnel) and station at Klosters, eliminating the former reversal there; the provision of a crossing-loop at Davos-Wolfgang, to cope with the increase in traffic to the Parsenn district (as reported in our columns at the time), and the raising of the maximum permissible speed from 45 to 55 km.p.h. The accompanying map gives a good idea of the system as a whole.

The board of the Rhaetian Railway recently decided to authorise the acquisition of four lightweight railcars, with a maximum speed of 65 km.p.h., and eight lightweight passenger coaches, involving a total expenditure of 1·7 million francs. The report of this system for 1937 showed fr. 3,666,356 net receipts, or 1,635,632 more than in the previous year, and the operation ratio was reduced from 77·79 to 67·98 per cent.



Sketch map of the area served by the Rhaetian Railway



Spirals in the Bergün–Preda section

DAMAGES FOR AEROPLANE ACCIDENT.—A settlement has been reached in the Manx High Court of an action brought by Mr. W. E. Teare and his wife against the L.M.S.R. and the Isle of Man Steampacket Company, the then joint owners of Manx Airways, claiming damages for injuries arising from an aeroplane accident three years ago. A Manx jury had awarded £11,585 to the two plaintiffs together, and to avoid a possible appeal to the Privy Council the total damages have now been agreed at £7,500.

STAFF AND LABOUR MATTERS

Decisions of Chairman of Railway Staff National Tribunal

Decision No. 4 of the Chairman of the Railway Staff National Tribunal, dated June 23, deals with a claim "That it is not in order to apply the spread-over arrangements to a signalman when it is necessary to bring in another man to cover his duties during the time he is booked off duty." The claim required decision on the basis of an agreed statement signed on behalf of the National Union of Railwaymen and of the railway companies and was one of interpretation of existing agreements or decisions. The Chairman had, therefore, no power to vary the agreements or decisions but only to interpret them.

The Decision states that passages in the following decisions of the National Wages Board were quoted in the submission: Nos. 2, 10, 15, 57, 106, 119, and 122. The last two decisions (Nos. 119 and 122) may be at once eliminated as irrelevant. No. 119 allowed (under certain conditions) a spread-over of 12 hours except for drivers, firemen, guards, and signalmen. In Decision No. 122, however, the board was unable to accept the contention of the N.U.R. that its Finding No. 119 did in fact curtail the spread-over permissible in the case of signalmen under Clause IV—Hours of Work (c) of its Finding No. 2. The Chairman of the Railway Staff National Tribunal finds that the position which results from the decisions duly made and still operative is as follows:—

A spread-over up to 10 hours a day may be put into operation for signalmen in cases where the men can be booked off and free from duty for the period in excess of the rostered day; also where circumstances render it essential, and it can be shown that further economy will accrue, the spread-over may be extended to a maximum of 12 hours a day. In both cases this rule is subject to the condition that the cabins or stations at which the signalmen are employed are such as are typified by the examples shown in the statements presented to the Board in January, 1922, and are unlike those presented in connection with the case upon which Decision No. 15 was given in December, 1924. Cases must be dealt with individually on their merits.

The Chairman concludes by stating that if it should be thought that this interpretation is such as to give no clear principle and to be likely to result in a considerable number of difficult and contentious cases the only remedy is to follow up this interpretative decision by new negotiations on substance followed in time, if necessary, by an application for a decision under the provisions of the Machinery of Negotiation which permits a consideration of an issue on merits as distinct from mere interpretation.

Decision No. 5

Decision No. 5 of the Chairman of the Railway Staff National Tribunal, dated June 23, deals with a claim that "where men are brought in to perform the duties of men who are booked off duty on a spread-over, the arrangements are unreasonable, and a contravention of National Wages Board Decision No. 15." The claim required decision on the basis of an agreed statement signed on behalf of the National Union of Railwaymen and of the railway companies and was one of the interpretation of existing agreements or decisions. This claim does not cover drivers, fireman, and guards, to whom spread-over is not applicable, and does not apply to signalmen in respect of whom a separate claim has been made. It turns upon whether the later decisions Nos. 119 and 122 affect the position in the case of grades other than signalmen (and excluding the three grades to which spread-over is not applicable). Decision No. 119 provides:—

A spread-over up to twelve hours a day may be put into operation in the case of all grades (except drivers, firemen, guards, and signalmen,) subject to review by the Central Wages Board or, on appeal, the National Wages Board in respect of any station where it is contended that such a spread-over is unreasonable.

The question is whether the preceding decisions are relevant in deciding what is "unreasonable"; or whether they are cancelled by Decision No. 119 and the appropriate tribunal is therefore free to decide upon what is reasonable or not without reference to these decisions. The National Wages Board in Decision No. 122 stated that it was unable to accept the contention of the National Union of Railwaymen that the Finding No. 119 did in fact curtail the spread-over permissible in the case of signalmen under Clause IV—Hours of work (*c*) of the Finding No. 2. It follows, however, that in especially excepting signalmen from Decision 119 the board intended that the decision should have an effect as regards other grades which it was not to have as regards signalmen.

The Chairman states the claim as submitted cannot be upheld; and he finds, as a matter of interpretation, that the effect of decision No. 119, the latest relevant decision, is that a spread-over for all the grades in question (*i.e.*, excluding signalmen) is permissible if it is not "unreasonable"; that the appropriate tribunal may decide what is "unreasonable" without being bound by decisions or precedents before the issue of decision No. 11 in March, 1931. That in the Chairman's view is as far as a purely "interpretative" decision can go in throwing light upon what is to be regarded as "unreasonable." It obviously gives little guidance for the settlement of actual cases and in his view, clear guidance can only be obtained as a result of a new negotiation on the substance of the problem, followed if necessary by a decision under the machinery of negotiation which would enable the merits of the question and not merely the texts to be considered.

Decision No. 6

Decision No. 6 of the Chairman of the Railway Staff National Tribunal, dated June 23, deals with a claim "that drivers who are normally employed on Sentinel locomotives but who, on occasions, are employed partially on such locomotives and partially on ordinary steam locomotives should be paid at their servitude rate, irrespective of the length of time occupied on ordinary steam locomotive work." The claim required decision on the basis of an agreed statement signed on behalf of the Associated Society of Locomotive Engineers and Firemen and of the railway companies and was one of the interpretation of existing agreements. The claim turns upon the scope of the supplementary agreement of May 15 and July 8, 1929, relating to drivers of Sentinel and other similar locomotives, as constituting a limitation of the rights as they would otherwise have continued under the main national agreement of August 29, 1919. The Chairman has come to the conclusion that the 1929 agreement does not prevent a man who is for any part of the day engaged upon work other than that defined in the specific provisions of the agreement from being paid for that day as he would have been had that agreement never been concluded. He therefore finds in favour of the claim.

MATERIALS AND THEIR TESTING.—The first meeting of the Joint Committee on Materials and Their Testing was held on January 12, 1937, and was attended by representatives of 21 out of the 22 institutions and societies which had then agreed to co-operate. At this meeting, Dr. H. J. Gough, M.B.E., F.R.S., was voted Chairman, and Mr. C. W. J. Taffs, M.Sc. (Eng.), of the staff of the Institution of Mechanical Engineers, was appointed Secretary. The Institution of Mechanical Engineers also placed office accommodation at the disposal of the Joint Committee. The first general discussion organised by the Joint Committee was held at Manchester on October 29, 1937, under the ægis of the Manchester Association of Engineers and was devoted to the subject of "Notched Bar Impact Testing." The papers then read are now available as a volume of 180 pages and can be obtained for 3s. 6d. post free from the Secretary, Manchester Association of Engineers, St. John Street Chambers, Deansgate, Manchester, 3. Arrangements are in progress for the second general discussion on a group of papers dealing with various aspects of non-destructive testing, including the use of X-rays and gamma rays, and magnetic, electrical, acoustic and general methods.

NOTES AND NEWS

Germany Reduces Visa Cost.—From July 2 the cost of a tourist visa to enter Germany has been reduced from 13s. 6d. to 1s. 8d.

L.N.E.R. Pacific Covers 1,000,000 Miles.—The L.N.E.R. Pacific locomotive No. 4476 *Royal Lancer*, on July 6, completed its millionth mile of running since it emerged from the Doncaster works in May, 1923.

Armour Plate Glass for G.W.R. Express Engines.—Great Western Railway express passenger engines are to be fitted with an improved safety glass of the armour plate type in order to give better protection to enginemen.

Canadian Pacific Earnings.—Gross earnings of the Canadian Pacific Railway for the month of May, 1938, amounted to $10,563,000, a decrease of $1,271,000 in comparison with May, 1937. In the working expenses of $10,141,000 there was a decrease of $119,000, leaving net earnings $1,152,000 lower at $422,000. Aggregate gross earnings for the first five months of 1938 were $51,143,000, a decrease of $422,800, and the net earnings of $2,170,000 showed a fall of $4,895,000.

Canadian National Earnings.—For the month of May, 1938, gross earnings of the Canadian National Railways were $13,909,678, a decrease of $2,961,148 in comparison with May, 1937. Operating expenses ($14,388,292) showed a decrease of $816,284, with the result that there was a deficit of $478,614, against net earnings of $1,666,250. Aggregate gross earnings for the first five months of 1938 amounted to $69,057,315, a decrease of $9,847,098, and, as against net earnings of $6,232,760 for the first five months of 1937, there was a deficit on working of $4,909,400.

Southern Electric Stoppage.—Electric trains on some of the South Coast lines were brought to a stop shortly after noon last Tuesday when lightning struck the grid system during a thunderstorm. The electricity supply in large areas of Kent and East Sussex was interrupted and for nearly half an hour the current was cut off sections of the Southern Railway between Redhill and Brighton and Eastbourne, Brighton and Lewes, and Brighton and West Worthing and Seaford. There was difficulty in re-establishing full working because some Post Office telephone lines were also struck during the storm, and for a while communications were partly suspended.

The Belvoir Castle Railway.—The Duke of Rutland has presented to the York Railway Museum a truck and short section of track from the Belvoir Castle Railway, which extended from Muston Gorse wharf on the Grantham Canal to Belvoir Castle. The line was about 2 miles long and was laid to the 4-ft. 4½-in. gauge. It was built by the Butterley Ironworks Company, opened in 1815, and remained in use until May, 1918. This interesting railway formed the subject of an illustrated article by Mr. Charles E. Lee in the June issue of *The Railway Magazine*.

New L.M.S.R. Halt at Grindley Brook.—A new halt at Grindley Brook between Whitchurch and Malpas, was brought into use by the L.M.S.R. on July 4. It is served by all local passenger trains between Chester and Whitchurch.

Purchase of Transandine and Cordoba Central Railways by Argentine Government—A Reuters message, dated June 24, from Buenos Aires, states that the Budget Commission of the Chamber has decided to draw up a report on the Bill for the purchase of the Argentine Transandine and Cordoba Central Railways by the State. The Foreign Minister, Dr. Cantilo, and the Minister for Public Works, Senor Alvarado, have both spoken in favour of the Bill before the Commission.

Institute of Transport Examinations, 1939.—The Institute of Transport announces that the next examinations for graduateship and associate membership will be held on April 27, 28, and 29, 1939, in London, and at a number of provincial and overseas centres. Full particulars, including previous question papers (price 1s. 0d. a set, post free), and copies of a revised and enlarged edition of a booklet entitled "The Institute of Transport Examinations: notes for the guidance of candidates unable to attend preparatory courses" (price 2s. 6d., post free) may be had on application to the Secretary, the Institute of Transport, 15, Savoy Street, London, W.C.2.

New G.W.R. Signal Boxes.—New signal boxes are to be provided between St. Germans and Menheniot and between Penwithers junction and Chacewater, Cornwall, in order to divide the present long sections and to facilitate the flow of trains. The St. Germans-Menheniot section is 5 miles 37 chains in length, the longest on the Paddington-Penzance route.

A Mixed Traffic Engine on the Coronation Scot, L.M.S.R.—The explanation of the appearance last Monday of the Coronation Scot running into Euston 21 min. late behind one of Mr. Stanier's standard mixed traffic 4-6-0 locomotives was that the regular engine had to be taken off the train at Leighton Buzzard because of the overheating of a big end. Newspaper reports that the lubrication system had failed and caused damage to one of the cylinders were not correct.

Railway Strike Threat in Queensland.—A Reuters message from Brisbane, dated July 5, reports that railway union officials are making immediate plans for calling a strike throughout the State. This step follows the decision of the Commissioner for Railways to penalise the men who left their jobs recently to attend a "stop-work" meeting to discuss their grievances. Mr. Forgan Smith, the Queensland Premier, has stated that the Provincial Government wholeheartedly supports the Commissioner.

London Transport's Fifth Birthday

Dr. Leslie Burgin, Minister of Transport, has sent his congratulations to Lord Ashfield and all the members of his staff on the attainment of "this interesting milestone in your history"—the fifth anniversary of the London Passenger Transport Board. "During its comparatively short existence," he says, "the board has established itself firmly in the interests and affections of all Londoners, both by the efficiency of its organisation and its desire to serve. It would have been easy for an organisation so vast in its ramifications to develop into a soulless machine. The unfailing courtesy of your staff, the constant attention to the comfort of your passengers, and the irresistible appeal of your posters completely falsify any such fears. The acute problems created by the unprecedented building development in the outer ring of London and the ever-growing volume of road traffic are being tackled by the board with courage and initiative. In addition, by encouraging the travelling habit of Londoners, the board has done much to weld the scattered peoples of the Metropolis into one great family. Such achievements merit our present congratulations and our confidence for the future."

Thanking Dr. Burgin for his tribute, Lord Ashfield stated "It gives all of us much encouragement in our task to receive such a message from you, and you may be assured that it will stimulate us to even greater efforts in the future. You have given much happiness to the five-years-old child."

Financial Position

The following comments on the financial position of the London Passenger Transport Board appeared in *The Economist* of July 2:—

"London Transport has this week completed its fifth year of service, at the end of which its 'C' stock stands no higher than 74¼, compared with 112¼ at one time in 1936, and 79 a year ago. The board's traffic returns for the 52 weeks to June 25 suggest that a substantial recovery has been obtained in gross receipts, for the total shows an increase of £657,100 to £29,388,200. This improvement, however, is more apparent than real, and its translation into terms of potential 'C' stock dividends is dangerous. In the first place, the receipts are shown before pooling with those of the suburban receipts of the main line railways. Secondly, the bulk of the "improvement" was con-

centrated in the last quarter of the year—the first three-quarters closed with a 'plus' of £127,600—and thus reflects the deficiency of the corresponding quarter of 1937, which showed a loss of £347,000, compared with 1936, as a result of the bus strike. It would appear that the Board has to some extent increased its normal traffic takings, and has re-attracted an appreciable part of the receipts which were temporarily lost after the strike. But it will be recalled that the operation of the London Transport pool worked in favour of the board in last year's abnormal circumstances. It may be presumed that wage costs increased on balance last year, and while the rise in fuel costs was checked for a time, the cost of the increased oil duty is estimated to amount to some £180,000 in a full year.

"It is clear, in fact, that the prospects for the 'C' stock final dividend, to be announced next October, cannot be assessed with any precision at present. The stock has received an interim payment of 1½ per cent., but the size of the final dividend this year is of crucial importance. Under the 1933 Act, holders of not less than 5 per cent. of the 'C' stock are empowered to apply to the High Court for a receiver in the event of the Board failing in respect of each of three consecutive years, of which the first shall not be earlier than the year ending June 30, 1936, to pay interest at the standard rate of 5½ per cent. on the 'C' stock. It would, presumably, be open to the Board to challenge the implications of this clause by a technical default on its provisions, if it took the view that renewals provisions must not be subordinated to dividend requirements, and that changes in operating conditions necessitated a revision of standard rates, but the consequences of such a policy would necessarily be far-reaching, both for the Board and the investor. It would be wholly premature to examine them here. Lord Ashfield has pointed out this week that it is too early to say what 'C' stock dividend rate will be paid for the year which has just closed. The 'C' stockholder will note that increased fares, in the chairman's view, would not necessarily ensure greater revenue."

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 26th Week			Totals to Date		
	1938	1937	Inc. or Dec.	1938	1937	Inc. or Dec.
	£	£	£	£	£	£
L.M.S.R. (6,852½ mls.)						
Passenger-train traffic...	691,000	680,000	+ 11,000	12,173,000	12,161,000	+ 12,000
Merchandise, &c. ...	425,000	500,000	— 75,000	12,145,000	12,776,000	— 631,000
Coal and coke ...	208,000	222,000	— 14,000	6,738,000	6,899,000	— 161,000
Goods-train traffic ...	633,000	722,000	— 89,000	18,883,000	19,675,000	— 792,000
Total receipts	1,324,000	1,402,000	— 78,000	31,056,000	31,836,000	— 780,000
L.N.E.R. (6,315 mls.)						
Passenger-train traffic...	415,000	432,000	— 17,000	7,865,000	7,964,000	— 99,000
Merchandise, &c. ...	300,000	360,000	— 60,000	8,454,000	8,831,000	— 377,000
Coal and coke ...	212,000	238,000	— 26,000	6,388,000	6,550,000	— 162,000
Goods-train traffic ...	512,000	598,000	— 86,000	14,842,000	15,381,000	— 539,000
Total receipts	927,000	1,030,000	— 103,000	22,707,000	23,345,000	— 638,000
G.W.R. (3,737 mls.)						
Passenger-train traffic...	264,000	272,000	— 8,000	5,022,000	5,080,000	— 58,000
Merchandise, &c. ...	176,000	200,000	— 24,000	4,923,000	5,127,000	— 204,000
Coal and coke ...	98,000	107,000	— 9,000	2,893,000	2,949,000	— 56,000
Goods-train traffic ...	274,000	307,000	— 33,000	7,816,000	8,076,000	— 260,000
Total receipts	538,000	579,000	— 41,000	12,838,000	13,156,000	— 318,000
S.R. (2,148 mls.)						
Passenger-train traffic...	387,000	393,000	— 6,000	7,788,000	7,827,000	— 39,000
Merchandise, &c. ...	65,500	67,500	— 2,000	1,568,000	1,606,500	— 38,500
Coal and coke ...	26,500	27,500	— 1,000	801,000	828,500	— 27,500
Goods-train traffic ...	92,000	95,000	— 3,000	2,369,000	2,435,000	— 66,000
Total receipts	479,000	488,000	— 9,000	10,157,000	10,262,000	— 105,000
Liverpool Overhead ... (6½ mls.)	1,393	1,406	— 13	35,203	32,703	+ 2,500
Mersey (4½ mls.) ...	4,280	4,255	+ 25	112,895	108,829	+ 4,066
*London Passenger Transport Board ...	583,500	582,400	+ 1,100	583,500	582,400	+ 1,100
IRELAND						
Belfast & C.D. pass. (80 mls.)	3,093	3,436	— 343	52,472	55,276	— 2,804
,, ,, goods	428	596	— 168	11,115	13,013	— 1,898
,, ,, total	3,521	4,032	— 511	63,587	68,289	— 4,702
Great Northern pass. (543 mls.)	13,100	14,150	— 1,050	238,650	239,850	— 1,200
,, ,, goods	9,450	9,400	+ 50	227,650	246,950	— 19,300
,, ,, total	22,550	23,550	— 1,000	466,300	486,800	— 20,500
Great Southern pass. (2,076 mls.)	42,780	46,030	— 3,250	821,840	812,861	+ 8,979
,, ,, goods	35,142	36,426	— 1,284	1,014,489	1,080,030	— 65,541
,, ,, total	77,922	82,456	— 4,534	1,836,329	1,892,891	— 56,562

* 1st week (before pooling)

British and Irish Railway Stocks and Shares

Stocks	Highest 1937	Lowest 1937	Prices July 6, 1938	Prices Rise, Fall
G.W.R.				
Cons. Ord. ...	67⅝	55¾	47	—
5% Con. Prefce. ...	127	108	110	+1½
5% Red.Pref.(1950)	113	109	109½	—
4% Deb.	113⅝	102½	108	+1
4½% Deb.... ...	118	106	109½	—
4½% Deb.	124½	112	115½	—
5% Deb.	136½	122¾	127	—
2½% Deb.... ...	76	64	67½	+1
5% Rt. Charge ...	133 7/16	118	125½	—
5% Cons. Guar. ...	133¾	116½	126½	+1
L.M.S.R.				
Ord.	36⅛	25⅜	16½	—
4% Prefce. (1923)	82½	65¾	46½	—
4% Prefce. ...	92½	77¾	66½	—
5% Red.Pref.(1955)	107¾	102	93½	—
4% Deb.	108	99¼	103½	+1½
5% Red.Deb.(1952)	117½	111	111½	—
4% Guar. ...	104	95⅞	98½	+1
L.N.E.R.				
5% Pref. Ord. ...	12½	6¾	5	—
Def. Ord.	6¼	3⅝	3	—
4% First Prefce.	79½	63	45	−1
4% Second Prefce.	31½	21	15	—
5% Red.Pref.(1955)	101¼	89¾	74	—
4% First Guar. ...	103	91⅞	90½	+2
4% Second Guar.	97⅝	85½	80½	+2
3% Deb.	84⅛	74	76½	+1½
4% Deb.	107¼	98½	101½	+1
5% Red.Deb.(1947)	113½	106½	109½	—
4½% Sinking Fund Red. Deb.	110 5/16	105½	106½	—
SOUTHERN				
Pref. Ord.... ...	98⅝	83½	69	+1
Def. Ord.	27⅞	16¾	17	+½
5% Pref.	126 1/16	105 13/16	108	+1
5% Red.Pref.(1964)	118	110¼	111½	—
5% Guar. Prefce.	133¾	116¾	125½	—
5% Red.Guar.Pref. (1957)	118½	111½	115	—
4% Deb.	112	101¼	106	+1
5% Deb.	135¾	123½	125½	—
4% Red. Deb. 1962–67	113	105	107	—
BELFAST & C.D.				
Ord.	5	4	4	—
FORTH BRIDGE				
4% Deb.	106	99½	99½	—
4% Guar. ...	105¾	99	99½	—
G. NORTHERN (IRELAND)				
Ord.	11	5	4½	—
G. SOUTHERN (IRELAND)				
Ord.	50	21½	20	—
Prefce.	61	34	19	−1½
Guar.	94¾	69½	48	−4
Deb.	95	82⅛	71	+1
L.P.T.B.				
4½% "A" ...	123¾	110½	116½	+½
5% "A" ...	135	121½	127½	+1
4½% "T.F.A." ...	108¾	104	106	—
5% "B" ...	125	114½	118½	+1
"C"	99¾	75	75	+1
MERSEY				
Ord.	42⅜	22	18	—
4% Perp. Deb. ...	103	96¾	101	—
3% Perp. Deb. ...	77⅝	74½	74½	—
3% Perp. Prefce.	68¾	61¼	65	—

CONTRACTS AND TENDERS

Beyer Peacock & Co. Ltd. has received an order for one 2-6-0 + 0-6-2 Beyer-Garratt locomotive, 3-ft. 6-in. gauge, from the Australian Portland Cement Proprietary Limited. The locomotive is similar in all respects to one delivered by the same builder in 1936 and is for service in Victoria.

Hurst Nelson & Co. Ltd. has received an order from the Crown Agents for the Colonies for 15 bogie tank wagon underframes complete with wheels and axles, for the Iraq Railways.

Guest Keen & Nettlefolds Limited has received orders from the Argentine North Eastern Railway for 60,000, and from the Entre Rios Railways for 10,000 fishbolts and nuts.

The Bengal-Nagpur Railway Administration has recently placed the following orders :—

Tilghman's Patent Sand Blast C o. Ltd. : One vertical air compressor.

The Blaenavon Co. Ltd. : 100 steel locomotive tyres.

Howell & Co. Ltd. : 300 Aquacidox superheater flue tubes.

R. A. Lister & Co. Ltd. has received an order from the Buenos Ayres Great Southern Railway for one Lister 38-h.p. stationary diesel engine.

Wota (India) Limited has received an order from the Indian Stores Department for 1,000 cast-steel buffer plungers.

Samuel Osborn (India) Limited has received an order from the Indian Stores Department for 800 buffer plungers.

Jessop & Co. Ltd. has received an order from the Indian Stores Department for 860 cast-steel axleboxes.

D. Wickham & Co. Ltd. has received an order from the Central Uruguav Railway for 22 Wickham light petrol-driven inspection railcars.

The directors of the Great Western Railway have authorised the placing of the following contracts :—

Holborn Construction Co. Ltd. : Reconstruction of bridge, and diversion of River Cherwell at Banbury.

Wharton Crane & Hoist Co. Ltd. : Supply and erection of two 20-ton electric overhead travelling cranes in the new carriage repair shop, Old Oak Common.

Craven Bros. (Manchester) Limited : Supply of two carriage wheel turning and grinding lathes for the new carriage repair shop, Old Oak Common.

W. T. Nicholls Limited : Construction of new station buildings at Haverfordwest.

Joseph Westwood & Co. Ltd. : Supply and erection of a goods shed at Cirencester Town.

C. & T. Painters Limited : Cleaning and repainting of the station buildings at Birmingham (Snow Hill) Station.

Turnerised Roofing Co. (Great Britain) Ltd. : Waterproofing the roof of the goods shed and of down platform of Port Talbot station.

At the Company's docks :—

The Wolsingham Steel Company : Renewal of top tumbler gearing of dredgers *Foremost* 49 and *Foremost IV*.

C. H. Bailey Graham & Co. Ltd. : Repairs to steam grabber *Grabber*.

For Caerphilly Works :

Wharton Crane & Hoist Co. Ltd. : Supply and erection of two 20-ton electric overhead travelling cranes in the carriage lifting shop.

Cowans, Sheldon & Co. Ltd. : Supply and erection of one 10-ton electric overhead travelling crane in the wheel shop.

Babcock & Wilcox Limited has received an order from the Indian Stores Department for one double-flued Lancashire-type boiler.

Diesel-engined Train Sets required for New Zealand

The New Zealand Government Railways Administration is calling for tenders for the supply of ten three-car diesel-engined train sets. Tenders should reach the General Manager, New Zealand Government Railways, Wellington, New Zealand, by September 5. A copy of the specification and general conditions of tender, together with drawings, may be borrowed from the Department of Overseas Trade, London, S.W.1. Local representation is desirable.

The Madras & Southern Mahratta Railway Administration has placed orders to the inspection of Messrs. Rendel, Palmer & Tritton, with the Glasgow Railway Engineering Co. Ltd. for 160 carriage and wagon axles, and with the Superheater Co. Ltd. for four sets of superheater elements and four superheater headers.

Bayliss, Jones & Bayliss Limited has received an order from the Central Argentine Railway for 200,000 fishbolts, nuts, and washers for 85-lb. rails.

The Siamese State Railways has placed the following orders for permanent way and permanent way details to be supplied to the inspection of Messrs. Sandberg :—

Société d'Ougree : 9,458 metric tons of 24·8 kg. per metre rails and 200,000 bearing plates.

S. A. Gilsoco and Boulonneries de Huy : 2,000,000 dogspikes.

La Brugeouise & Necaise et Delcuve : 15 sets of double slips.

Foulart Frères : 400,000 spring washers.

Neunkircher Verke : 200,000 fishbolts.

Bochumer Verein A.G. : 100 sets of simple turnouts.

The G.W.R. announces the following works to be undertaken :—

BRIDGE RECONSTRUCTIONS

The following bridge works are to be carried out :—

Reconstruction of the underbridge carrying the railway lines over Bell Lane, near Pilning.

Reconstruction of the bridge which carries the road over the Cardiff Docks to Maerdy Junction line near Pontypridd (Taff Vale section).

The bridge carrying the main lines over a public footpath and cycle track, near Swindon, is to be partially reconstructed.

A public footbridge over the Zig Zag branch, near Dowlais (Cae Harris) is to be reconstructed.

The number of spans of an underbridge at Tylwch is to be reduced from three to two, a concrete abutment being built to carry the necessary extension of the embankment.

At North Acton a bridge carrying Chase Road over the railway is to be widened to 40 ft., at the request of the Acton Corporation.

ADAPTATION OF ROLLING STOCK

Twenty-six old eight-wheeled passenger underframes are to be adapted as Bocar wagons for the conveyance of pressed steel motorcar bodies from the Pressed Steel Company's works at Cowley, Oxford.

SAFETY GLASS FOR ENGINE FOOTPLATES.

The principal passenger engines are to be fitted with very greatly improved safety glass of the Armourplate type, in order that better protection may be given to drivers and firemen. The ordinary safety glass with which these engines are now fitted is to be transferred to engines engaged in lower speed work.

TRACK FOR TRAINING OF MOTOR DRIVERS.

During the course of each year the company trains some 150 to 200 new road motor drivers, and in the past instruction has been carried out on cars in service. The heavy volume of traffic now on the roads, and the numerous regulations relating thereto, make it increasingly difficult and expensive to ensure a good standard of training. A special track, with the necessary gradients and curves, is to be provided on the Bath Road side of the main line at Taplow, where a higher standard of training can be given in an economical way.

MISCELLANEOUS WORKS.

Henwick.—Relaying work is shortly due to be carried out at Henwick, and at the same time a shunting spur there is to be lengthened to enable heavy traffic to be dealt with independently of the main line.

Landore.—Better to meet the requirements of the large number of engines using the shed at Landore, the 25-ft. coalstage is to be extended by 15 ft.

Slough.—Additional accommodation is to be provided for the stores department at Slough where requirements in connection with the road motor repair depot have grown considerably.

West Acton.—Under the scheme for extending the Ealing and Shepherds Bush Railway from North Acton to Denham, improvements are to be effected to both East and North Acton stations. There has been considerable residential developments in the vicinity of West Acton and the buildings at that station also are to be reconstructed, on similar lines.

At Swindon Works.—The plant in the steam-hammer shop at the locomotive works, in which the heavy forgings and stampings for engines are produced, is to be increased by the provision of a new 5/6 ton drop hammer.

The Bombay-Baroda & Central India Railway Administration has recently placed the following orders to the inspection of Messrs. Rendel, Palmer & Tritton :—

The Superheater Co. Ltd. : 140 superheater elements.

Banting & Tresilian Limited : 51 copper firebox plates.

Miller & Co. Ltd. : 800 chilled cast-iron wheels.

Kitchen & Wade Limited : One belt-driven vertical drilling machine, and one electrically-driven, portable, universal radial drilling machine.

Dean, Smith & Grace Limited : one belt-driven centre lathe.

Webster & Bennett Limited : One single table vertical boring and turning mill.

B.E.N. Patents Limited informs us that Robert H. Kulka Limited, of Shell-Mex House, Strand, W.C.2, has been appointed sole agent and distributor for the B.E.N. range of air compressors, spray paint plant, and garage equipment for all Latin America.

STRENGTHENING AN L.M.S.R. MAIN-LINE VIADUCT.—Monsal Dale viaduct, which carries the Derby-Manchester main line of the L.M.S.R. at a height of 75 ft. over the River Wye and several roadways, and consists of five 50-ft. spans, was built in 1862 and is now to be strengthened so as to carry the heaviest locomotives. A reinforced concrete raft is to be placed on the top of the present arches and the spandrils are to be filled with concrete. The raft will be waterproofed and covered with a protective layer of fine concrete on which the ballast will be placed. The work is to be carried out during the next seven months under one line at a time, the other line being used for the single line operation of all traffic.

OFFICIAL NOTICES

Bombay, Baroda and Central India Railway Company

NOTICE IS HEREBY GIVEN that the One Hundred and Fifty First General Meeting of the Bombay, Baroda & Central India Railway Company will be held at Southern House, Cannon Street, London, E.C.4, on Wednesday, the 20th July, at 1 o'clock precisely.

(1) To receive the Directors' Report and Accounts.
(2) To declare a dividend.
(3) To transact the general business of the Company.

Warrants for the guaranteed interest and dividend will be forwarded on the 20th day of July to Stockholders registered in the Company's books on the 25th day of June, 1938.

By Order,
N. LINCOLN,
Secretary.

N.B.—A copy of the Directors' Report and Accounts can be obtained by any Stockholder on application to the Secretary.

Offices:
The White Mansion,
91, Petty France,
Westminster, S.W.1.
4th July, 1938.

QUESTIONS IN PARLIAMENT

Morden Underground Line New Rolling Stock

Mr. H. Day (Southwark Central—Lab.) on June 29 asked the Minister of Transport whether he would give particulars of the reports he had received as to the progress that had been made in lengthening the station platforms on the Morden underground line in order to allow longer trains to be run; and could he say whether the necessary rolling stock had been provided or was under construction.

Dr. Leslie Burgin (Minister of Transport): I am informed by the London Passenger Transport Board that new rolling stock for the Morden-Edgware line is under construction and that delivery has already begun. The new trains will have 15 per cent. more accommodation and their greater power of acceleration and deceleration is expected to increase the capacity of the line still further. In these circumstances it is not proposed to lengthen the platforms at present.

Facilities to Glasgow

Mr. T. Johnston (Stirling and Clackmannan Western—Lab.), on July 6, asked the Minister of Transport if he would give particulars of the reductions in fares afforded to the English public desirous of visiting the Empire Exhibition at Glasgow by the railway companies since April 13.

Dr. Leslie Burgin (Minister of Transport): I am informed by the railway companies that since the opening of the Exhibition on May 3, the following reduced fare facilities have been available to visitors: Cheap monthly return tickets, available for periods of more than one day up to one calendar month, are issued from any station in Great Britain to Glasgow at approximately 1d. a mile, third class, a reduction of 33⅓ per cent. on the ordinary fare. Day excursion facilities are offered from the more important towns throughout the country and, where the anticipated traffic is insufficient to warrant the running of special excursion trains, the facilities are, by special announcement, available by ordinary trains where the service permits. In addition, specially reduced fares for day outings are quoted for parties of not less than eight passengers at approximately ¾d. a mile, third class, a reduction of 50 per cent. on the ordinary fares. Parties of not less than 25 passengers desiring a two-day facility are given special reductions on the ordinary fares varying from approximately 50 to 75 per cent., according to the size of the party and the distance from Glasgow. This facility is available by ordinary and special services.

Fencing Electrified Lines

Brigadier-General Clifton Brown (Newbury—U.) on June 29 asked the Minister of Transport whether, in view of the fact that at least eight children had been fatally injured by coming into contact with the live rail on the Southern Railway in the last 12 months, he would introduce legislation to compel railway companies to erect new protective fencing at once, and not allow them to electrify new areas in country districts until the proper fencing had been erected.

Dr. Leslie Burgin: In accordance with the statement which I made in reply to my hon. and gallant friend on November 3, 1937, the Southern Railway Company is providing special fencing in places where trespassing by children is prevalent or is likely to occur. This fencing is, so far as practicable, provided before services are introduced on newly electrified lines. It would not be correct to assume that all the eight children referred to in the question got on to the line owing to inadequate fencing. In the circumstances I see no justification for introducing legislation.

Excursion Services

Mr. W. Lunn (Rothwell—Lab.), on July 6, asked the Minister of Transport whether he would take up with the companies concerned the necessity for some improvement, in the future, in excursion services, in view of the unsatisfactory nature of many of these services, as instanced by the fact that an L.M.S.R. excursion left Leeds for Blackpool on Saturday last at 7 a.m. and did not reach its destination, a distance of about 70 miles, until 11.55 a.m., and that it left Blackpool on the return journey at 9.15 p.m. and did not arrive in Leeds until 2.50 a.m., that there were no corridor coaches on the train; and that there had been no alteration in these conditions for excursionists for many years.

Dr. Leslie Burgin (Minister of Transport): I have no jurisdiction in this matter. I am, however, in communication with the L.M.S.R. about the excursion to which Mr. Lunn refers, and will let him know the result.

Mr. Lunn: In view of the fact that there is a great deal of publicity about the development of speed and comfort on the main lines, is it not time that something was done with cross-country services which are not improved either in speed or comfort in the last 50 years?

Dr. Burgin: I am not quarrelling with the hon. Member's general conclusions, but his question relates to a specific excursion, and of that I wish to make inquiries.

Parliamentary Note

Progress of Railway Bills

The Lords Amendments to the London & North Eastern Railway Bill and to the Southern Railway Bill were agreed to on July 1.

RAILWAYS ATHLETIC ASSOCIATION ANNUAL SPORTS.—A full programme of events was keenly contested at the Railways Athletic Association championships and sports held under A.A.A. laws, on July 2, at the York Railway Institute Sports Ground, York. Those present included Mr. C. M. Jenkin Jones, Divisional General Manager, North Eastern Area, L.N.E.R., accompanied by Mrs. and Miss Jenkin Jones; Messrs. W. O. Davies, L.M.S.R.; R. H. Pitts, L.P.T.B.; and E. A. Richards and W. Dunning, S.R. The one-mile flat championship was won by J. F. Bain of the G.W.R. (London) Harriers in 4 min. 3 sec., and the one-hundred yard flat championship by B. E. Sales, Metropolitan Railway A.A. in 10·3 sec. The ladies one-hundred yard flat championship was won by K. L. Fenn of the L.N.E.R. (North Eastern Area) A.A. in 11·6 sec. Derby won the three-mile team race, and the L.N.E.R. York Resident Engineers beat the London Electric Railway Institute A.A. (L.P.T.B.) in the tug-of-war.

Railway Share Market

The general tendency in the stock and share markets has again been cheerful, and although the fluctuations of Wall Street prevented best prices from being maintained, the upward movement in values continued in most sections of the Stock Exchange.

Home railway junior stocks were a rather more active market in the early part of the week, but subsequently they were affected by the traffic figures, which were again disappointing and attracted a good deal of attention as they complete those for the first half of the year. In view of the large decreases in receipts shown by the latter, the market is prepared for the forthcoming half-yearly dividend statements to compare very unfavourably with those of a year ago. On the other hand, it is realised that if hopes of improved trade conditions in the more immediate future are borne out, traffics would make a sharp improvement. Consequently the junior stocks will probably attract a fair amount of attention if markets continue to show an upward tendency, although for the time being there is, of course, an increased disposition to await the interim dividend statements.

Great Western ordinary went back to 47¼ and L.M.S.R. ordinary to 16⅝. L.M.S.R. 4 per cent. preference, after an earlier small improvement, reacted to 66½ and the 1923 preference to 46. Southern preferred was in some request around 69¾ on the hope that the interim payment may be maintained at 2 per cent., but the deferred was moderately lower at 16⅜. The market is hopeful that expansion in the company's tourist traffic will be shown, and that as a result ancillary revenue may benefit a good deal during the next few months. L.N.E.R. stocks were affected by the large decrease of £103,000 in the past week's traffic; the first preference was reactionary at 45, as was the second preference at 14½. On the other hand, the company's first and second guaranteed stocks were better at 90½ and 80½ respectively, while the 3 per cent. debentures improved fractionally to 76½ and the 4 per cent. debentures to 101½. Guaranteed and debenture stocks of other main line railways were firm and in some cases also slightly higher in price. London Transport 4½ per cent. and 5 per cent. "A" stocks were higher at 117 and 127½ respectively, while more attention was given to the "C" stock at around 74¾ in response to the hopeful dividend estimates current in the market.

Among securities of the Argentine railways the tendency was for profit-taking to develop on any improvement in the ordinary stocks, but a firmer trend was observable in debenture and preference stocks of the B.A. Gt. Southern and Central Argentine. B.A. Pacific and Argentine Great Western debentures received more attention, as did Cordoba Central debentures. Elsewhere, San Paulo ordinary and Leopoldina debentures were better. American railroad shares and Canadian Pacific fluctuated moderately following their recent gains.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1937 38	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1937	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1937	Prices: Lowest 1937	Prices: July 6, 1938	Yield % (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	3.7.38	12,650	– 510	27	426,100	440,390	– 14,290	Ord. Stk.	29	10¼	10	Nil
	Argentine North Eastern	753	2.7.38	11,011	+ 1,081	1	3,412	3,840	– 428	,,	19¼	6	6	Nil
	Argentine Transandine	—	—	—	—	—	—	—	—	A. Deb.	93½	60	80	5
	Bolivar	174	May, 1938	3,450	– 2,650	22	19,050	29,300	– 10,250	6 p.c. Deb.	9½	5	8½	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	17	9	5½	9⅛
	Buenos Ayres & Pacific	2,806	2.7.38	66,563	– 12,283	1	19,231	33,809	– 14,578	Ord. Stk.	17⅛	5½	5	Nil
	Buenos Ayres Central	190	18.6.38	$110,200	– $52,800	51	$5,791,000	$7,175,000	– $1,384,000	Mt. Deb.	41½	18	14	Nil
	Buenos Ayres Gt. Southern	5,084	2.7.38	117,494	– 2,481	1	36,166	51,116	– 14,950	Ord. Stk.	33¾	13½	14	Nil
	Buenos Ayres Western	1,930	2.7.38	39,888	– 5,521	1	8,374	15,942	– 7,568	,,	31¾	11¼	10	Nil
	Central Argentine	3,700	2.7.38	105,124	– 28,412	1	24,150	62,506	– 38,356	,,	34¼	10⅝	10	Nil
	Do.	—	—	—	—	—	—	—	—	Did.	20½	4½	4½	Nil
	Cent. Uruguay of M. Video	972	25.6.38	17,044	— 188	52	982,025	933,167	+ 28,858	Ord. Stk.	6 7/32	2	2½	Nil
	Cordoba Central	1,218	—	—	—	—	—	—	—	Ord. Inc.	6¼	1½	3/2	Nil
	Costa Rica	188	May, 1938	22,104	– 3,850	48	283,030	218,282	+ 64,748	Stk.	38	27	26½	7 9/16
	Dorada	70	May, 1938	18,300	+ 4,300	22	79,200	76,400	+ 2,800	1 Mt. Db.	107	106	105	5 11/16
	Entre Rios	810	2.7.38	15,490	+ 2,483	1	4,621	5,397	– 776	Ord. Stk.	19 7/16	6	6	Nil
	Great Western of Brazil	1,092	2.7.38	4,700	– 2,000	27	183,600	199,800	– 16,200	Ord. Sh.	5/4	1/8	1/4	Nil
	International of Cl. Amer.	794	May, 1938	$528,092	– $1,314	22	$2,584,877	$2,710,414	– $125,537	—	—	—	—	—
	Interoceanic of Mexico	—	—	—	—	—	—	—	—	1st Pref.	2/-	1/-	1/2	Nil
	La Guaira & Caracas	22¾	June, 1938	4,600	— 770	26	30,235	33,705	– 3,470	Stk.	8½	6	8½	Nil
	Leopoldina	1,918	2.7.38	22,516	– 991	27	483,796	587,397	– 103,601	Ord. Stk.	9¼	3	2	Nil
	Mexican	483	30.6.38	$368,900	– $21,700	26	$7,838,400	$8,069,000	– $230,600	,,	1½	1/4	5/16	Nil
	Midland of Uruguay	319	May, 1938	8,322	– 153	48	104,249	96,221	+ 8,028	,,	1/8	1/2	1/2	Nil
	Nitrate	386	30.6.38	2,146	– 4,280	26	80,833	86,845	– 6,012	Ord. Sh.	3 1/16	2	2	5
	Paraguay Central	274	25.6.38	$4,439,000	+ $387,000	52	$172,169,000	$159,648,000	+ $12,521,000	Pr. Li. Stk.	84	79¼	62½	9 5/8
	Peruvian Corporation	1,059	June, 1938	66,731	– 12,548	52	946,133	987,424	– 41,291	Pref.	14 5/4	4½	3¼	Nil
	Salvador	100	25.6.38	¢11,690	– ¢1,210	52	¢995,235	¢1,231,008	– ¢235,773	Pr. Li. Db.	23½	21½	22½	Nil
	San Paulo	153½	26.6.38	34,487	– 565	26	803,053	829,900	– 26,847	Ord. Stk.	98½	56	43	9 5/16
	Taltal	160	May, 1938	1,820	– 1,490	48	36,805	37,920	– 1,115	Ord. Sh.	17 16	11 16	5/4	13 5/16
	United of Havana	1,353	2.7.38	13,604	– 5,859	1	3,356	7,703	– 4,347	Ord. Stk.	5 8/8	5 1/32	2	Nil
	Uruguay Northern	73	May, 1938	851	+ 128	48	10,331	10,856	– 525	Deb. Stk.	10	2	2	Nil
Canada	Canadian National	23,781	30.6.38	878,855	– 132,381	26	16,551,911	18,999,262	– 2,447,351	—	—	—	—	—
	Canadian Northern	—	—	—	—	—	—	—	—	4 p.c.	—	—	—	—
	Grand Trunk	—	—	—	—	—	—	—	—	Perp. Dbs.	77	62½	62½	6/8
	Canadian Pacific	17,186	30.6.38	682,200	– 44,400	26	12,257,600	13,358,000	– 1,100,400	4 p.c. Gar.	101 7/8	94½	102½	3 7/8
										Ord. Stk.	18	7¼	7½	Nil
India†	Assam Bengal	1,329	10.6.38	37,605	+ 2,773	10	261,071	250,365	+ 10,706	Ord. Stk.	86	73½	78§	3 5/16
	Barsi Light	202	20.6.38	2,692	+ 232	12	30,997	27,487	+ 3,510	Ord. Sh.	66½	46	60	8 5/16
	Bengal & North Western	2,116	10.6.38	84,187	+ 45	10	624,262	662,609	– 38,347	Ord. Stk.	317	301	291½	6 5/16
	Bengal Dooars & Extension	161	20.6.38	4,129	+ 289	12	28,478	27,146	+ 1,332	,,	100	84	85½	7
	Bengal-Nagpur	3,268	20.6.38	193,125	– 2,296	12	1,647,867	1,666,913	– 19,046	,,	101	89	91½	4 5/8
	Bombay, Baroda & Cl. India	3,085	30.6.38	231,075	– 2,925	13	2,418,000	2,485,950	– 67,350	,,	113	110½	110½	5 7/16
	Madras & Southern Mahratta	2,967	10.6.38	162,300	+ 12,425	12	1,182,996	1,138,361	+ 44,635	,,	110	105	107	8 7/16
	Rohilkund & Kumaon	571	10.6.38	16,941	– 1,067	10	129,592	131,941	– 2,349	,,	314	302	298½	6
	South Indian	2,531¾	10.6.38	123,761	+ 11,247	10	843,468	836,478	+ 6,990	,,	103½	99½	101½	4 11/16
Various	Beira-Umtali	204	Apr., 1938	80,098	– 2,647	31	608,683	501,230	+ 107,456	—	—	—	—	—
	Egyptian Delta	620	10.6.38	5,231	– 560	10	39,141	40,250	– 1,109	Prf. Sh.	31/-	5/4	5/4	Nil
	Kenya & Uganda	1,625	May, 1938	219,888	+ 5,337	22	1,281,351	1,336,076	– 54 725	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb	48 1/3	43 1/2	41 1/2	8 7/16
	Midland of W. Australia	277	May, 1938	16,589	+ 4,979	48	164,158	144,240	+ 19,918	Inc. Deb.	98	93 1/2	93 1/2	4 1/4
	Nigerian	1,900	14.5.38	32,532	– 23,270	7	196,978	422,866	– 225,888	—	—	—	—	—
	Rhodesia	2,442	Apr., 1938	394,424	– 16,169	31	2,906,452	2,520,488	+ 385,964	—	—	—	—	—
	South Africa	13,263	11.6.38	614,745	– 16,171	11	6,206,335	6,340,464	– 134,129	—	—	—	—	—
	Victoria	4,774	Apr., 1938	871,575	– 13,515	44	8,166,486	8,519,336	– 352,851	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16

† Receipts are calculated @ 1s. 6d. to the rupee § ex dividend.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements are based on the current rates of exchange and not on the par value

No Contents -

Diesel Railway Traction

Engine Water Circulation

ALTHOUGH, in general, the hotter the cooling water the better the engine will work, it is most undesirable that there should be any formation of steam, and, apart from the complete cessation of circulation due to a failure of the water pump, it is probable that the most prolific cause of interference with the cooling system is the presence of air or steam locks in the water spaces. It is in the design stage that trouble can be avoided by shaping the parts so that there is no local pocketing, particularly near the combustion chambers. Definite cooling in this area can be provided by means such as the Sulzer syphon arrangement illustrated on p. 1138 of the June 10 issue of this Supplement. But as many existing designs have small pockets it is essential always to keep the circulating water moving rapidly under a pressure of, say, 10 to 14 lb. per sq. in., and to keep the highest parts of the jackets flooded. Quite a small air or steam lock is capable of suspending the circulation round that cylinder, with probable resulting damage to the liner and piston. A rapid circulation is also an advantage in districts where the water used for circulation contains matter in suspension, as it keeps the passages clear and prevents any deposition or silting up at points where the velocity of flow tends to drop.

The French Railcar Position

AT the beginning of this year there were in service on the French National Railways no fewer than 662 railcars and 11 special railcar trailers. Of this number 168 have petrol engines and the remainder diesel engines. The petrol-engined cars are confined to two makes, viz., Bugatti and Michelin, the latter having pneumatic tyres. Among the oil-engined vehicles, the Renault standard car, with one 220-, 265-, or 300-b.h.p. 12-cylinder vee engine, according to the period in which it was built, is far and away the most popular, 186 of the type being in service. Another 31 Renault vehicles of various powers and layouts are also in service. Next on the diesel list are the 40 De Dietrich cars powered by two 160-b.h.p. Saurer engines and with Mylius-type gearboxes, closely followed by 36 Standard cars with one or two 300-b.h.p. engines, These 662 railcars had covered up to January last a total of 71,000,000 miles, although it was not until 1931 that the first of them was put upon the rails, and the daily mileage of the railcar stud is 90,000. Railcars now operate about 20 per cent. of the total passenger train miles and over 11 per cent. of the total freight and passenger train miles on the French National Railways. This proportion is being steadily increased as new cars are put into traffic, and at the beginning of the year 140 new railcars and 42 special railcar trailers were on order. In this total were 22 Standard cars with two 300-b.h.p. engines. 21 Renault cars with two 300-b.h.p. engines, and 16 Renaults with one 16-cylinder vee 500-b.h.p. engine. Except for 28 cars (including the 10 Nord triple-car trains) in traffic and about 25 on order, all the cars have mechanical transmission. Of the 140 railcars on order, 118 have oil engines and 2 are steam cars. All the cars now being built are of the double bogie type of medium or high powers (300 to 600 b.h.p.) and practically all of them have a high power-weight ratio, amounting to 15 or 16 b.h.p. per ton of tare weight in certain of the Renault and Decauville cars, and to over 20 b.h.p. per ton in the 96-seater Michelin. Several important changes have been made in the fast-railcar operation in the summer timetables. The Paris—Brussels run is replaced by a steam train owing to the heavy patronage, but the Paris—Liége run has been prolonged to Maastricht, in Holland, and another fast return trip has been introduced between Lille and Paris; all these runs are worked by the Nord triple-car trains. Also, owing to increased patronage, the fast railcars between Paris and Lyons have been replaced by streamlined steam trains, and have been transferred to the Lyons—Geneva service. A fast daily return trip has also been inaugurated between Paris and Strasbourg, and is being operated by triple-car Bugattis. Taken over the whole railcar stud, the average number of failures per 100,000 miles is only 2·64, whereas with steam trains operating on *rapide* and express services it is 5·5. The number of failures with railcars has been reduced consistently during the past six years, due to the greater experience and the better organisation of repairs, although the railcars are now used more intensively than ever. Among future intentions is the introduction of a fast service—with the Nord triple-car trains—between Boulogne and Basle, connecting with the 9.0 a.m. departure from, and the 11.0 p.m. arrival at, Victoria.

Railcar Performance in Rhodesia

THE Ganz 240-b.h.p. diesel-mechanical railcar which was set to work in 1936 on the Salisbury—Shamva line of the Rhodesia Railways (see issue of this Supplement for October 30, 1936), has proved very successful and popular with the public. The return service between Shamva and Salisbury every day except Saturday and Sunday has materially helped towards the increased revenue derived from second class and native passengers. The timing for the 86½-mile single journey including 19 stops is 3½ hr., or four hours faster than the previous mixed steam train. According to the recently-issued General Manager's Report, the car during the past year covered 50,782 miles against 54,250 miles scheduled, giving an availability of 93½ per cent. It averaged 7·37 miles per gal. of fuel. The receipts per mile throughout the year averaged 29·12d., and the expenditure exclusive of depreciation 13·2d. per mile. The traffic carried by the railcar during the past year amounted to 3,770 European passengers, 35,418 native passengers, 30,217 mail bags, 14,875 gal. of cream, and 230 tons of miscellaneous parcels. Of the 313 round trips scheduled in the year, only 12 were missed for mechanical reasons and 8 as the result of an accident. The performance of this car has led to proposals to acquire further railcars for service on other branch lines where their running would better meet the requirements of the public, and it is likely that an order will be placed at an early date.

THE TRANSMISSION OF POWER

Some of the features of drives through fluid couplings

IN his paper before the Institution of Mechanical Engineers on April 22, Mr. Harold Sinclair threw a good deal of light on points associated with the use of fluid couplings on the Föttinger principle operating in conjunction with internal-combustion engines and electric motors.

The constant-filling type of fluid coupling in most general use is known as the traction coupling, or in its earliest form, as the "fluid flywheel." It is used mainly to permit easy starting and to prevent stalling of internal-combustion engines and alternating-current electric motors when connected to heavy loads. The drive is taken smoothly and automatically as the engine or motor is accelerated, and at normal speeds of revolution it is practically positive, with an average efficiency of 97-99 per cent.

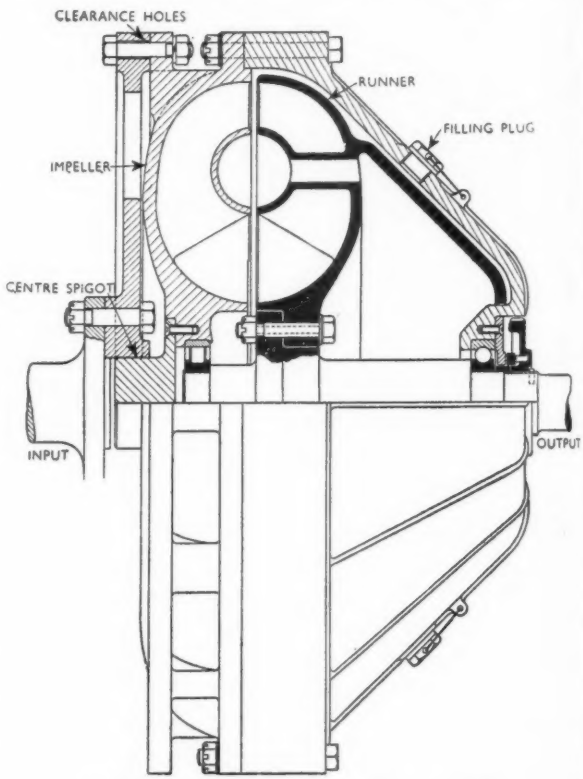
The first hydraulic problem to arise in the case of the constantly-filled coupling was that of reducing the residual or stalled drag torque, without at the same time increasing the slip at normal running speeds. In the case of a road or rail vehicle at a temporary stop, the engine is normally idling with gear engaged, and a low drag torque is essential to reduce the tendency for the vehicle to creep, especially in low or second gear. Some internal-combustion engines are not capable of slow idling, by which is meant a speed of 20-25 per cent. of the normal full speed, and in those cases the reduction of the drag torque is a matter of great importance. In many cases the coupling is also required as a load-limiting device, so that the driven shaft can be stalled while the motor continues to run at, say, one-and-a-half to twice full-load torque for a short period, until the cause of the overload is removed, or an overload trip with a delay characteristic cuts off the power. It will be recognised that a sufficient drag torque is essential, as the means by which the motor sets the driven shaft in motion. The two most satisfactory and simple methods of reducing drag torque are those employed in the semi-flexible type traction coupling, namely, the reservoir chamber on the back of the runner and the anti-drag baffle near the inner profile diameter. When the runner is installed the working circuit partially empties into the reservoir, thus reducing the torque, and further, the baffle interferes with the circulatory flow of the remaining liquid so that the drag torque is reduced to about one-quarter that of the original fluid flywheel or plain Vulcan coupling.

Fluid Couplings and Epicyclic Gearboxes

An interesting peculiarity of the constant-filling fluid coupling, which can be turned to advantage when it is used with an epicyclic gearbox or a constant-mesh lay-shaft gear with individual friction clutches, is the momentary softness of the coupling at the instant of torque reversal and the consequent collapse of the vortex of liquid. The clutches by which each gear ratio is engaged in such constant-mesh gearboxes must be capable of transmitting much more than the normal full-load torque in order to obviate the possibility of sustained slipping. If an error is made in changing gear it is possible for severe shocks to be imposed on the transmission due to synchronism forced by the powerful engagement of the epicyclic brakes or clutches.

In the case of the Cotal epicyclic gear with electro-magnetic clutches, it is possible to use the peculiar softness of the coupling to cushion the variation in torque at the moment of changing gear in a simple manner. The Cotal gear control switch is arranged to be preselective in the sense that the operating lever is connected to the moving switch blade through a spring link, and movement of the switch blade is prevented by an interlock with the engine throttle or fuel control, which permits the change of gear to take place only at the instant when the throttle is momentarily closed. When applied to a car, the driver changes up by moving the control lever to the selected higher gear position and momentarily easing the accelerator, whereupon the switch blade flicks to the selected gear position and the appropriate magnetic clutches engage the new gear.

Thus the action of releasing the accelerator causes a reversal in the torque transmitted through the fluid coupling, and effects the change of ratio in the Cotal gearbox at the same instant, *i.e.*, when the liquid vortex ring is in a collapsed condition and momentarily incapable of transmitting high torque. In other words, the vortex behaves at this instant as if the coupling were largely emptied of liquid.



Vulcan-Sinclair rigid-type traction coupling located by centre spigot

The control switch with its interlock is so arranged that it is possible to change down by preselecting the required gear and pushing the accelerator pedal down to the limit of its travel, so as to trip the switch blade and make the gear change with the engine at full throttle. In this case the reversal of torque and resultant collapse of the vortex ring is effected by the quick acceleration of the runner shaft of the coupling due to the lower gear being electro-magnetically engaged, and in consequence the fluid coupling is in the desired momentarily soft condition during

the instant that the engine is accelerating to pick up the drive in the new ratio.

By effecting the gear change during the instant that the vortex ring has collapsed, the electro-magnetic clutch can take up the drive with very little slip, whereas an instant later, when the clutch is in full engagement, the vortex action is re-established in the coupling, and the transmission of power is again practically positive.

Mounting on the Crankshaft

The mounting of a traction coupling between an internal-combustion engine and gearbox usually requires provision to be made for differential expansion between the impeller and the driving disc or flywheel. Some problems are commonly involved in connection with the method of supporting the overhanging weight and the driving of auxiliaries in the case of diesel rail vehicles. For the impeller a high-tensile aluminium alloy is largely employed on the grounds of lightness and strength under rotational stresses, and good heat dissipation. It is not considered good practice for the impeller to be bolted through its boss to the crankshaft because of the high loadings in the bolt holes, and further, because any work involving the removal of the coupling necessitates its being opened up, possibly in some outlying workshop. It is better for the coupling to be assembled as a unit on a clean bench and mounted complete on the engine flywheel or driving disc. In early days, the coupling was registered by a spigot of large diameter near the driving flange, and in some cases this was subjected to excessive loading because of the difference in expansion of the aluminium compared with the steel driving disc. A variety of solutions were considered, one successful method being the use of an intermediate mounting ring of relatively slender section bolted to the impeller at six equidistant points and to the driving disc at six points spaced midway between them. In another case tangential links were used, each being bolted at the ends to the impeller and at the mid point to the driving disc; although their strength was far in excess of the driving torque, they could not withstand the stresses arising when the engine was running through a torsional critical speed. The best practice at present is to have a coupling registered for concentric running by a spigot of small diameter in the bore of the driving disc, with the bolts fitted in the impeller driving flange passing through clearance holes in the disc to permit of creep due to differential expansion, heavy Grover washers being used to give additional resilience to the clamped joint.

Diesel Shunters

When a diesel-mechanical shunting locomotive is seen at work, the impression is gained that the heating of the fluid coupling must be considerable because of the repeated starting of loads of many hundreds of tons, but experience shows that the actual stalled period is so brief that the average running slip, including the frequent starting, is only a small percentage. No special measures require to be taken to supplement the natural cooling of such couplings in locomotives of 200 to 300 b.h.p., and much larger powers are feasible so far as this consideration goes. Diesel railcars with change-speed transmissions involve no problem whatever on this score.

AUDIBLE WARNINGS FOR RAILCARS

Compressed air whistles in British and French practice

IN France the number of railcars put into service in recent years has increased considerably, and the problem of providing them with warning horns has become a matter of some urgency. A practical and inexpensive form of warning apparatus is needed, and one whose note is not likely to be confused with other sounds. A whistle worked by compressed air from the brake cylinders was tried, but it was found that the heavy air consumption (900 to 1,000 litres per working minute) retarded the braking action, and the reserve of compressed air of a railcar is limited. Horns similar to those fitted on road lorries were also used experimentally, with disastrous consequences, for pedestrians at level crossings were expecting road vehicles, not railcars, and were consequently taken off their guard.

After numerous tests, the constituent companies of the present French National Railways adopted an apparatus that emits alternating notes, somewhat similar to those used on fire-engines but with a distinctly different sound. These railcar horns give the notes E flat and G (with sound frequencies of 307·5 and 357·5 respectively) through a trumpet fitted with a diaphragm worked by compressed air at approximately 100 to 115 lb. per sq. in. They are actuated by either a three-way handle or an automatic distributor. These audible warnings have proved successful and the public has soon learned to recognise them at a great distance.

Theoretically, the deeper note (E flat) has a greater carrying capacity, as the deadening effect produced by the air on a low-frequency wave is less than that on one of high frequency; in practice, however, it has been proved that the higher note carries better. The horns are generally placed low down at each end of the vehicle, under the buffing gear. This position has been chosen because sound waves tend to rise, and they would be more easily distinguished by pedestrians than if the hooters were placed high up. The note is caused by the vibration of a metallic membrane against a dome tuned to the required pitch.

Originally, the compressed-air warners were worked by a three-way handle which enabled the notes to be played *ad lib.* by hand or foot. This practice has been discontinued and the handle replaced by a compressed-air distributor working first the low note then the higher one. The sounds follow one another at regular intervals. When the distributor is set in action and turned off almost immediately, only one blast of each note is emitted.

During tests carried out by the former Eastern Railway of France with various kinds of audible warners worked by air and distributor, observers were placed along the track to ascertain the carrying capacities of each type. It was found that the automatic distributors gave decidedly better results. The maximum carrying power of such hooters was 3·5 miles. It has been calculated that the production of a cubic metre (35·3 cu. ft.) of compressed air at 100 lb. per sq. in. costs 7 French centimes. Thus, admitting that the warner works 20 times in an hour, for 15 seconds at a time (a consumption of 1 cu. m. of air per min.), the expenditure for an 8-hr. period would be 2·80 fr., whereas for a horn using only 0·25 cu. m. of air per minute (9 cu. ft.) the expenditure for eight hours of service would be only 70 centimes. It is this type of horn which is now used on the A.E.C. railcars running on the Great Western Railway.

New Zealand Activity

In accordance with the policy of using railcars more extensively, the New Zealand Government Railways have placed an order with the Vulcan Foundry Limited for ten diesel railcars, as recorded exclusively in THE RAILWAY GAZETTE for May 27. The contract called for the delivery of the first car within 14 months, and the completion of one car every fortnight thereafter. The bodies and underframes are to be all steel and will be carried on welded steel bogies with roller bearing axleboxes. Each car will have a bogie-mounted 275-b.h.p. Vulcan-Frichs oil engine, a Vulcan-Sinclair fluid coupling, and a five-speed Wilson epicyclic gearbox, arranged to give a top speed of 75 m.p.h. A driving compartment is to be provided at each end, and there will be seats for 52 passengers, together with luggage and lavatory accommodation. The entrance doors are to be power operated. The cars are to be used in both North and South Islands. Additional to these ten cars and the six Leyland-engined units being built in New Zealand, the Government Railways are to call for tenders for the supply of ten three-car diesel set trains, each with a seating capacity of 150.

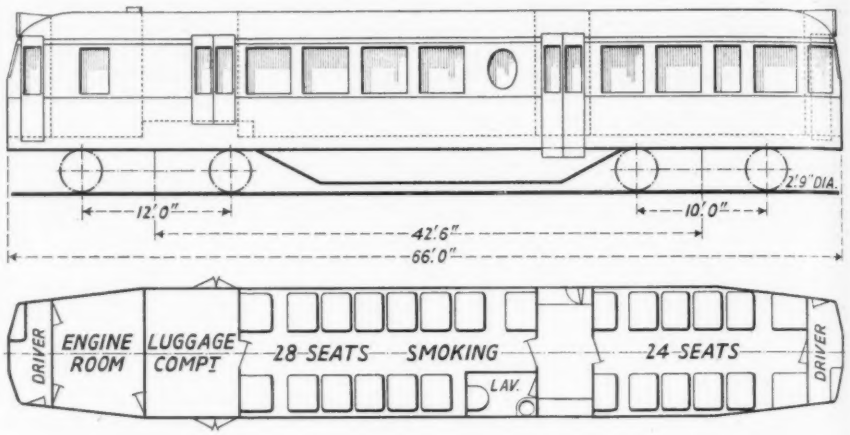


Diagram of Vulcan diesel mechanical railcars with 275-b.h.p. engine for operation on 3-ft. 6-in. gauge lines on the North and South Islands of New Zealand

An Indian-Built Railcar

A FOUR-WHEELED diesel-engined railcar, designed for both passenger and light goods service, has recently been delivered to the 2 ft. 6 in. gauge Baraset-Basirhat Light Railway, in Bengal. This new car was built entirely in the Calcutta shops of Walford's Transport Limited, and if it proves satisfactory in service, similar units will be built to take the place of present steam locomotives.

A 13-ft. modified standard Commer chassis, with a 7-ft. wheelbase, has been used, and power is provided by a 55-b.h.p. Perkins Leopard diesel engine located centrally on flexible mountings. The torque is transmitted through a Borg & Beck clutch, a four-speed gearbox, and thence through an open-type propeller shaft fitted with double Hardy Spicer universal joints of the needle-bearing type. The final drive is through duplicate sprockets and a $2\frac{1}{2}$-in. roller chain.

Braking on all four wheels is by the Cowdrey compensating internal-expanding shoe system. The front drums are fitted direct on the wheels, but the rear drums work on the rear axle, and function through chains. Fuel is supplied from a 20-gal. tank by a mechanically-operated pump. The injection equipment is of C.A.V.-Bosch make and the auxiliary electrical apparatus is by Lucas. Compressed air for the brakes is obtained from a compressor supplying air to two large-capacity high-pressure tanks situated beneath the chassis.

The body has been specially designed to give good visibility and ample ventilation. The outer panels are constructed of hardened Masonite, lined with Venesta board. The interior of the roof is of steel-covered teak, over which waterproof canvas is stretched. The upper half of the body has glass windows all round. Only the rear windows and side doors are adjustable, but ventilation is given by the trellised construction of the front portion.

The Flying Varberger

A FAST Swedish railcar service known as the Flygande Varbergaren (Flying Varberger) is being inaugurated by the Varberg-Borås-Herrljunga Railway, with two new 75-seater diesel cars built by the Linke Hoffmann works. The V.B.H. Railway first introduced diesel traction in 1929, but this is its first excursion into the realms of the express railcar. This line, as its name denotes, connects the State Railways' electrified main Stockholm—Gothenburg and Gothenburg-Malmö lines at Herrljunga and Varberg respectively. At Borås it crosses the Gothenburg—Borås—Alvesta section of the Gothenburg—Småland—Karlskrona Traffic Union. The new railcars, therefore, should considerably expedite through passenger traffic between Stockholm and the Halland coast at Varberg, the only alternative route being that of the State lines running into Gothenburg and out again.

On a recent trial, one of the Flying Varberger cars maintained a speed of 100 km.p.h. The normal maximum on the V.B.H.R. is only 90 km.p.h. owing to the lightness of the permanent way. On this same trial the journey from Borås to Herrljunga, 43 km., was covered in 33 min. The cars are semi-streamlined, and their internal fittings attain the highest standard of comfort set by Scandinavian main line practice. The fastest existing steam trains cover the Herrljunga—Borås section in 49 min. (summer timetable), with stops at Ljung, Borgstena and Fristad. In the reverse direction there is a non-stop express, which, however, takes the same time as the best southbound train.

CEYLON ACCIDENT.—Mr. B. Palmer, Acting Deputy Mechanical Engineer, Ceylon Government Railways, tells us that the accident to which we referred on p. 957 of the May 13 Supplement was incorrect, in that actually it was the diesel train which cut a fallen tree in two.

Thirteen Years of Diesel Traction in Czechoslovakia

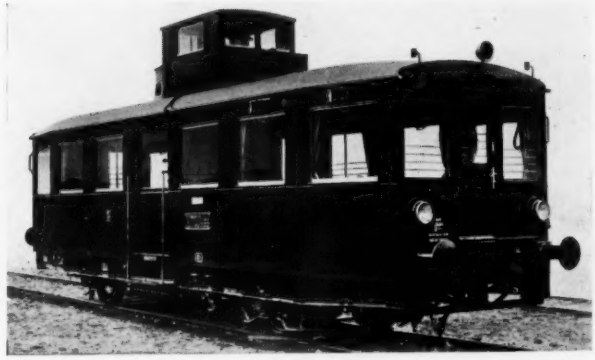
By G. HARCAVI

THE Czechoslovak State Railways have made one of the biggest advances in the use of internal-combustion railcars of any country in Europe. The Czech railcar stud is second only to those of France and Germany, and at present there are more than 500 railcars in service, very many of which pull trailers.

Apart from one or two initial experiments, the serious inauguration of railcar traction over Czechoslovak State lines took place in 1925. Since then developments have been rapid. The first use of railcars was made in the hope of banishing from secondary lines mixed goods and passenger trains, as these were felt to be anachronistic in an age of high-speed travel. The evolution of the railcar enabled mixed trains to be divided up without at the same time incurring heavy expenditures, such as would have been involved in the construction of new steam trains for passenger traffic.

Of an annual total of 13 million railcar train-km. (8,060,000 miles), on secondary lines more than 40 per cent. represent services which have replaced steam trains. This substitution is much appreciated by the travelling public and has led to the demand for new connections at more suitable hours. Incidentally, such claims had hitherto remained ungranted on account of the considerable expense involved.

The economic boom of 1928 and 1929 on one hand, and road competition on the other, led the railway administration to grant more and more concessions, and 7,500,000 train-km. (4,650,000 miles) now run by railcars represent new branch-line services which have been provided in addition to existing schedules. The timetables of the numerous smaller lines have also been completely revised and improved on those of ten years ago. On thirty secondary lines, having an average length of approximately 15 km. (9·3 miles), steam traction has been suspended for passenger services, and the public now travels exclusively by light railcars maintaining shuttle services. For a total of sixty small lines having an average length of 35 km. (22 miles) railcar services are in the majority. Over some of these routes only one mixed train or one passenger train is booked. The total number of such lines

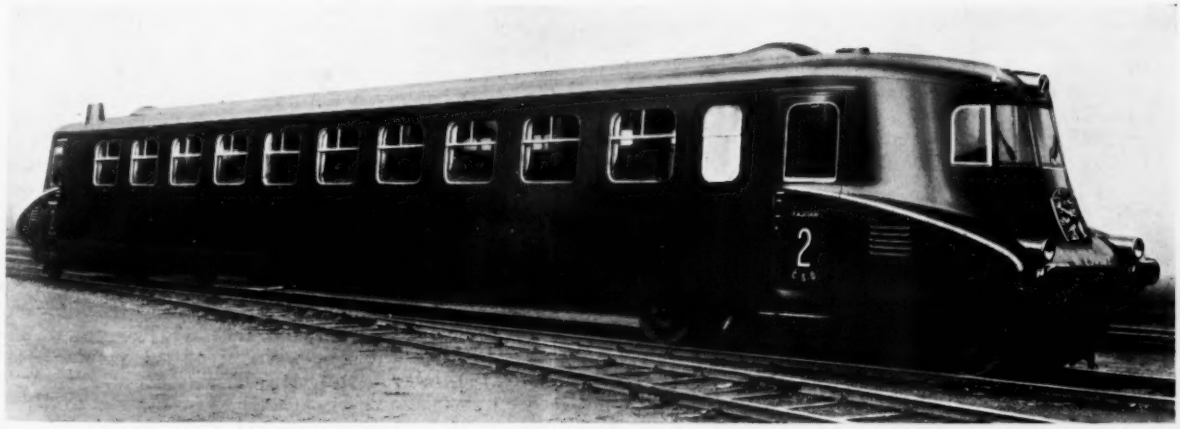


120-b.h.p. diesel-mechanical car used for light trailer haulage on secondary line stopping trains

represents about 15 per cent. of the total length of line of the whole system, or approximately 40 per cent. of the total length of secondary lines included in the State Railway system. The remaining 60 per cent. of small lines has seen developments and growth in passenger traffic. The public using these branch lines is easily pleased, so that even if the average speed of the cars is not greatly in excess of the former steam services, and even if the standards of comfort still leave something to be desired, the passengers are well satisfied with their more frequent connections.

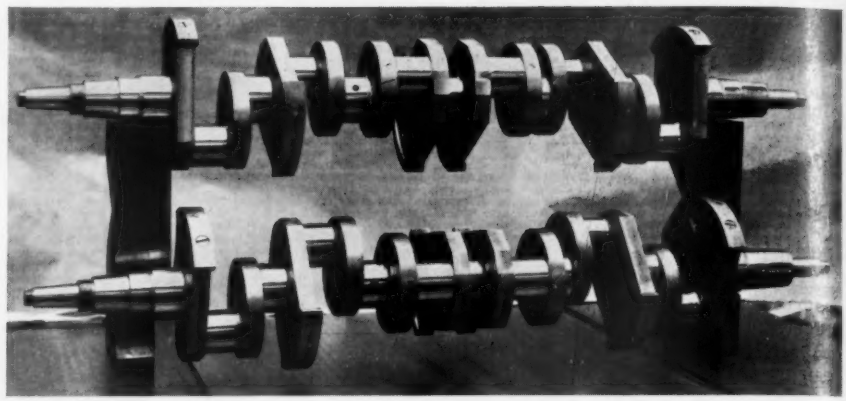
Local and Main Line Services

The increased power now developed by diesel engines enables higher-powered railcars to be used over some of the more important routes, and also over the main lines themselves. This is accomplished by eliminating lightly-trafficked steam trains which were expensive to run. Services now maintained by railcars, taken at roughly 12,000,000 train-km. (7,440,000 miles), represent the replacement of more than 40 per cent. of steam trains. The remainder is made up of new services and, in 25 cases, by the creation of direct railcar connections which eliminate changes *en route*. These schedules work over partly main and partly secondary lines and would not have been feasible in pre-railcar days, on account of the impossibility

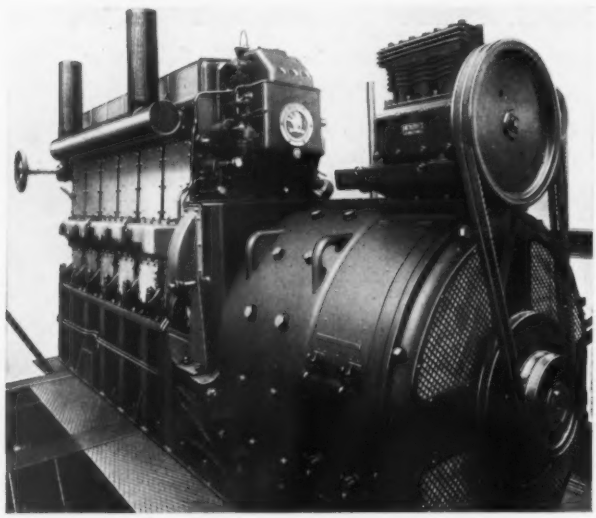


The main-line railcar, "Slovak Arrow," which has electro-mechanical transmission

Right : Balanced crankshafts of one of the several Skoda railcar oil engine models



Below : 400-b.h.p. six-cylinder Skoda oil engine as used for main-line railcars in Czechoslovakia



of running heavy locomotives and rolling-stock over light track.

The use of two-axled medium-weight railcars for this type of service is very varied. In the first place, railcar rakes have been substituted for steam trains running at slack hours of the day, and railcars or railcar trains have also been introduced where need has long been felt, without appreciably increasing running costs. The average speed of a railcar train, allowing the same number of station stops and slacks as apply to steam trains, is not generally greatly superior to the latter type of service. In fact, in spite of easy starting, railcar speeds are occasionally inferior to those of a high-speed steam train. Therefore railcars of this type are not always introduced with the idea of cutting hours of travel, but to provide better running facilities and working economies.

In 1936 medium-weight railcars covered in local stopping service nearly 7,000,000 train-km., or 50,000 km. (31,000 miles) per vehicle including railcars under repair. With the intention of offering the public some rapid railcar services, new double-bogie types have been put into operation; also two new super-speed cars, so that more than 30 rapid shuttle services have been created, providing connections, most of them additional to the steam services, over an average distance of 125 km. (78 miles). Railcars are also at work for third-class high-speed services and each unit covers an average distance of 190 km. (118 miles) at a speed of 52-60 km.p.h. (32-37 m.p.h.), just a little faster than the express steam trains running over the same routes. The two above types of service together covered in 1936 a distance of 2,500,000 train-km. (1,550,000 train miles), or approximately 48,000 km. (29,760 miles) per railcar. The latest high-speed type, known as the Slovak Arrow, runs between Prague and Bratislava, a distance of 400 km. (248 miles), on a schedule of exactly 4½ hr., including an intermediate stop, at an average speed of nearly 90 km.p.h. (55 m.p.h.), which is more than 30 per cent. in excess of the best steam timings over the same section. During a year each of these new railcars covers an average of 115,000 km. (71,500 miles).

Types of Car in Use

The running department of the Czechoslovak system has hopes of introducing a further definite programme of railcars for the future. They have been classifying the vehicles at present in operation to discover for which type of service each is most suited. The classifications of the cars now at work are, briefly:—

A Branch line service.
B Services calling at all stations on secondary and main lines.
C Express and high-speed services over main lines.
D Super-speed services.

Type A.—These are light two-axled cars with third class accommodation only. They seat from 30 to 37 passengers and have a driving cabin at each end or else a central look-out tower. The normal running speed is from 40 to 60 km.p.h. (25 to 37 m.p.h.). The weight per axle varies from 5 to 8·8 *tonnes* and the total weight from 10 to 17½ *tonnes* loaded. These cars are capable of hauling two 9-*tonne* trailers up gradients of 1 in 100. They are heated by exhaust gas. Lighting is by electricity and braking by compressed air. The engine (some are of the horizontal type) is rated at 65 to 125 b.h.p. and mechanical transmission is used. The wheelbase varies from 4 to 5·3 m. (13 to 17 ft.). The 120-b.h.p. type has given the most satisfactory results.

Type B.—Medium-weight two-axle cars, third class only, with seating accommodation for from 48 to 58 passengers. Either-way operation and a maximum speed of 50 to 70 km.p.h. (31 to 46 m.p.h.) have been provided. They have an axle load varying from 11 to 15½ *tonnes*, a total service weight of 22 to 31 *tonnes*, and can haul two 10-*tonne* trailers up gradients of 1 in 100. They are heated by exhaust gas and by hot water from a stove. Electric lighting and compressed-air braking are installed. The power unit is either petrol or diesel, with an output varying from 100 to 160 b.h.p., and it works in conjunction with electric transmission. The wheelbase is from 5·8 to 6·2 m. (19 ft. to 20 ft. 6 in.). The best results in this category are obtained with the 160-b.h.p. type fitted with diesel power units; they attain a maximum speed of 70 km.p.h.

(43 m.p.h.) and seat 44 passengers. The maximum axle load is 12·7 *tonnes*.

Type C.—These are double-bogie vehicles, generally of one class only, but occasionally second and third mixed; the seating accommodation varies from 62 to 81. They are fitted with either end drive and have a maximum speed of 100 km.p.h. (62 m.p.h.). The axle loads are from 10 to 14·5 *tonnes*, and the total service weight about 55 *tonnes*. Up gradients of 1 in 200 they can haul two trailers, composed of ordinary coaches, each weighing 34 *tonnes*. Exhaust gas and water provide the heating, and in some cases preliminary heating or supplementary electric heating is carried out. The power units are either petrol or diesel, and are mounted either on the bogies or in the frame. The powers range from 100 to 480 b.h.p., with either electric or mechanical transmissions. The bogie wheelbases are 2·1 to 3·6 m. (7 ft. to 12 ft.), and the distance between bogie pivots is 10·1 to 15·8 m. (33 ft. to 52 ft.). Among the different types in category *C*, the best results have been given by the 420-b.h.p. diesel-engined model, in which the power unit rests on the bogies. These have an axle load of 13·3 *tonnes*, a maximum speed of 110 km.p.h. (68 m.p.h.) and a seating capacity of 76 (one class only). The seats have padded backs.

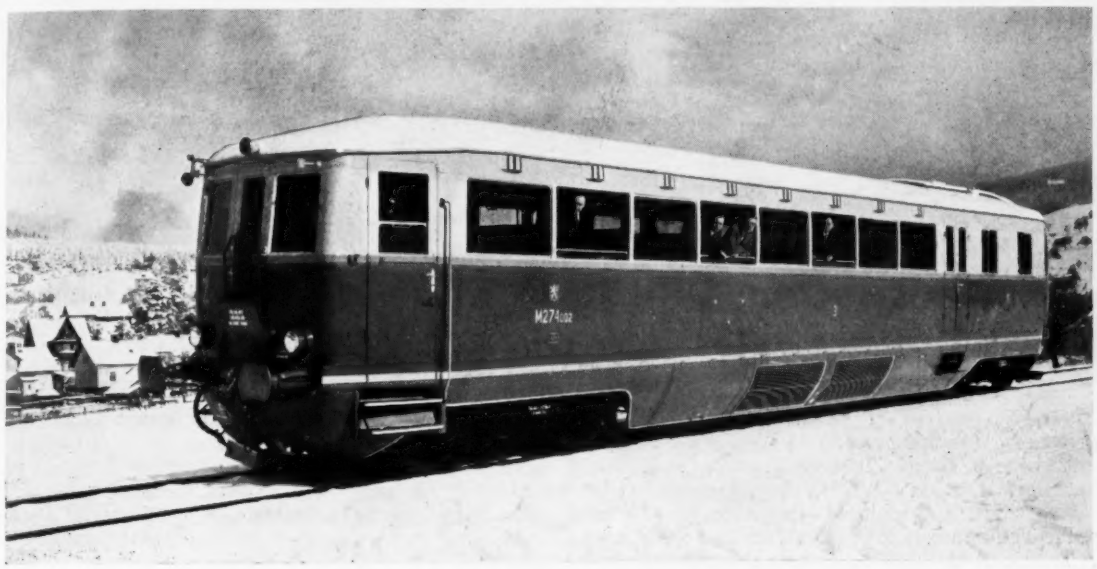
Type D.—This fourth category comprises high-speed double-bogie units of single class, with padded seats and seat backs. They have accommodation for 72 persons and are provided with a buffet. They have reversible drive, a maximum speed of 130 km.p.h. (81 m.p.h.), an axle load of 11 *tonnes*, and a service weight of 42·5 *tonnes*. They are heated by water from a special coke-burning stove, and are lit by electricity. Compressed-air braking is fitted. The two 175-b.h.p. power units rest on the bogies and have Sousedik electro-mechanical transmission. The bogie wheelbase is 4·15 m. (13 ft. 8 in.) and the distance between bogie pivots 18·5 m. (61 ft.).

Railcars of this type have been constructed only within the last two years or so; they are not fitted with normal buffing and drawbar apparatus, and do not haul trailers.

Trailers

The Czechoslovak State Railways have many trailers of special construction to give additional passenger accommodation. These vehicles have the following characteristics: *Type A*.—Two-axled vehicles seating from 40 to 50 passengers, and suited to railcars of types *A* and *B*. Three trailers are the maximum allowed per train; 197 of these units have baggage compartments and a further 67 have postal compartments as well. *Type B*.—Bogie vehicles with seating accommodation of 80, and intended for use with railcars of type *C*; not more than two trailers may be hauled by one car. Trailers of types *A* and *B* have the normal buffing and drawbar apparatus.

All these vehicles are non-articulated, and no decision has yet been made to build articulated stock, or to use multi-car trains of any form. Only cars of type *C* are fitted with multiple-unit control. Occasionally railcar rakes comprising a light unit hauling two or three trailers are assisted by the addition at the tail end of another light power unit with observation turret, to which again trailers are frequently added. Rakes composed of two four-axled railcars, or of three railcars with four trailers of special design coupled between them are also used. The main object of using diesel railcars is to bring about running economies and improvements in schedules, without at the same time increasing expenditure—although a hope is cherished that the public will cultivate a taste for more luxurious travel, even if it be at the cost of slightly higher fares than those now obtaining.



400-b.h.p. diesel-electric railcar, Czechoslovak State Railways

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DE DIETRICH AGENTS.—Gossell & Son Ltd., of 110, Cannon Street, London, E.C.4, have been appointed sole representatives for the British Empire of De Dietrich & Cie., of Reichshoffen and Niederbronn, France. Many De Dietrich diesel railcars are at work in France, Syria, and Tunis.

BRITISH DIESEL BUILDERS.—Mr. Charles Day, Chairman of Mirrlees, Bickerton & Day Limited, has been appointed to the board of Petters Limited, and Mr. A. P. Good, a director of Petters Limited, has been elected to the board of Mirrlees, Bickerton & Day Limited. Mr. Charles Day at the recent annual meeting of his company, said that these appointments formed a friendly link between the two companies and should prove useful if any closer link was desired later. No negotiation for a closer connection was under consideration at the moment.

ARTICULATED TRAINS FOR NORTH AFRICA

Express sets give improved accommodation and faster services on narrow-gauge desert lines

FOLLOWING extremely efficient operation of six standard-gauge 300-b.h.p. Renault diesel-mechanical railcars (see *Diesel Railway Traction Supplement* for September 4, 1936), which, despite somewhat unfavourable operating conditions, cover over 350,000 miles a year, the Tunisian Railways (Cie. Fermière des Chemins de fer Tunisiens) decided to extend the same form of traction on the metre-gauge system in the southern half of the country. To that end, twelve twin-articulated De Dietrich cars were ordered, and are now operating on the Tunis—Sousse—Sfax—Gabes, Sousse—Tozeur, and Tunis—Kalaa Djerba lines.

A small kitchen for the preparation of simple meals is incorporated in eight of the units, and this reduces the seating capacity from 62 to 56 third class, the first and second class accommodation in both types being 16. The tare weight of the kitchen units is 40·7 *tonnes* and the gross weight 50·75 *tonnes*, whereas the ordinary cars scale 39·5 and 50 *tonnes* respectively. Both models have space for 1½ *tonnes* of baggage, a postal room, and two lavatories.

In view of the climate, a good deal of care has been taken to provide adequate insulation against the heat. The whole exterior has been given a coating of aluminium paint; there is a double roof with aluminium foil between the two; the side panels have an inside insulation lining of an asbestos-bitumen base; and the wood floor is protected by an aluminium plate with a covering of down in the intervening space of 22 mm. Air is admitted through adjustable ventilators located above each window, and provided with filters, and is withdrawn through extractors in the roof. Electrically-driven fans assure the ventilation during prolonged stops. Light-metal adjustable louvres are fitted inside each window.

Integral all-steel bodies and underframes are used, and apart from sundry changes necessitated by the narrow gauge and the hot climate of North Africa, the mechanical construction is the same as that of the De Dietrich double-engined 210- and 320-b.h.p. single unit cars running in numbers on the French National Railways. Power is provided by two six-cylinder four-stroke Saurer engines developing a maximum of 200 b.h.p. each at 1,500 r.p.m., and mounted one on each end bogie together with a four-speed Mylius gearbox, which gives a track speed of 75 m.p.h. with normal maximum engine revs. Both engines and both gearboxes can be controlled from either driving position.

Special protective plates and casings are fitted round the engine, and transmission to prevent the ingress of sand while running over the desert. The driving bogies have a wheelbase of 12 ft. 2 in., and the articulation bogie 9 ft. 2 in. In view of the open line conditions in Tunis, the ends of these trains have been reinforced to provide a strong nose, akin to that of the Zephyr trains in the U.S.A. A double air brake system is fitted and operates on all wheels; it comprises an automatic brake working at constant pressure and a high-speed brake in which the pressure varies with the track speed. Two small electric headlamps are fitted at each end, but to give additional indication at night of the approach of the railcar a vertical beam is mounted on the roof at one end.

OIL FROM COAL IN SOUTH AFRICA.—Investigations are now being made in South Africa as to the possibilities of producing petrol and oil from the indigenous coal and from torbanite by means of the Fischer-Tropsch system. The South African Torbanite Company envisage the erection of a £3,000,000 plant, probably in Transvaal.

MORE ARGENTINE TRAINS.—Five diesel trains are to be bought for the Cordoba Central Railway at a cost of £176,800, and will be used for suburban services and for longer runs over the main line. The Government decree authorises the State Railways to purchase this equipment from the Cia. General Electric S.A., and the trains will be of the Ganz type. It is estimated that these five trains will save about 1,000,000 pesos a year in operating costs. The Cordoba Central Railway is to be purchased by the Argentine Government.

Main Line Locomotives for Argentina

TWO 900-b.h.p. diesel-electric locomotives have been delivered by Harland & Wolff Limited for service on the 5-ft. 6-in. gauge main lines of the Buenos Ayres Great Southern Railway. They have the 1-Do-1 wheel arrangement, and each weighs 103 tons in working order; the top speed is 62 m.p.h. Over buffers the length is 50 ft. Timken roller bearing axleboxes are used throughout, and there are Stone's Tonum headlights at each end. The vacuum brakes include two 24-in. cylinders which give a braking force of 87 per cent. of the adhesive weight.

There are two Harland-B. & W. two-stroke engines with direct-coupled generators, and the output from the eight 180 mm. by 300 mm. (7·1 in. by 11·8 in.) cylinders of each engine is 500 b.h.p. at 800 r.p.m., giving a piston speed of 1,890 ft. a min. and a m.e.p. of 66 lb. per sq. in. The scavenging is of the usual Harland uni-directional flow type, with scavenging ports round the cylinder barrel and a single large-diameter exhaust valve in the cylinder head. The rotary blower is driven from the engine, and is fitted with a Vokes filter and air inlet silencer. Harland-B. & W. fuel pumps and injectors are used. The lubricating oil and cooling water pumps are engine-driven. Both oil and water are cooled in radiators mounted on the sides of the locomotive, and air is drawn through the radiators and expelled upwards by electrically-driven fans in the roof. A single welded steel bedplate carries the engine and generator, and that portion below the engine is formed as a sump. Two fuel tanks with a combined capacity of 500 gal. are placed one on each side of the engine, and two water tanks, aggregating 96 gal. are suspended from the roof.

The electrical equipment of each locomotive comprises two Brown Boveri main generators and auxiliary generators, four nose-suspended traction motors, and Brown Boveri servo field regulator control. The main generators have a continuous rating of 300 kW. 550 volts at 800 r.p.m. and have a heavy current output at low voltages in order to cope with high initial tractive efforts. The 120-volt 32·5-kW. auxiliary machines supply, in combination, the current for the radiator fan motors, traction motor blowers, vacuum brake exhauster, air compressor, fuel transfer pump, lighting, control, and main generator excitation. The four Laurence, Scott force-ventilated traction motors produce a maximum tractive effort of 30,000 lb. Ventilating air is sucked in through Visco box-type filters.

AN AMERICAN MISHAP

One of the Chicago, Rock Island & Pacific Rocket trains, hauled by a 1,200-b.h.p. diesel-electric locomotive, after striking at high speed a heavy lorry at a level crossing

EXPRESS DIESEL-ELECTRIC LOCOMOTIVES IN FRANCE

A comparison of the two 4,000-b.h.p. designs now running on the ex-P.L.M. system

BOTH of the high-power high-speed oil-electric locomotives ordered over three years ago by the P.L.M. Railway (now the Region du Sud-Est of the French National Railways) are now running experimentally, the locomotive with the M.A.N.-type engines having been delivered a month or two ago, and that with the Sulzer engines almost a year ago. Despite the thousands of kilometres now run by this second unit, complete satisfaction has not yet been obtained, due principally to the electric transmission.

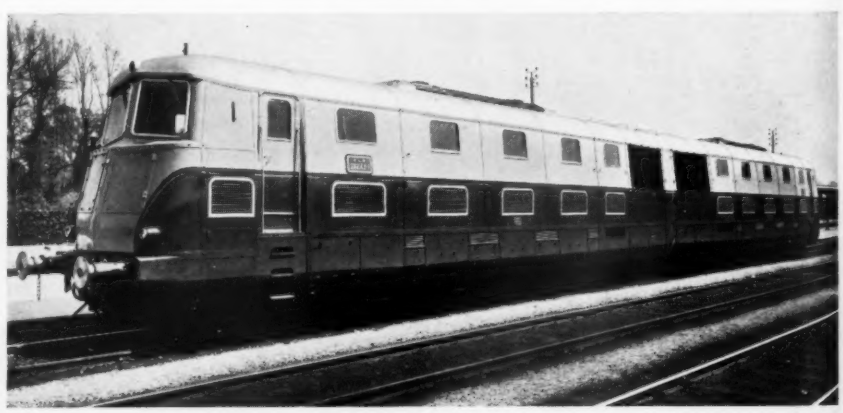
The original specification of the two locomotives was based on the haulage of a train *de luxe*, corresponding to the Cote d'Azur Pullman, with an average weight of about 330 tons and a maximum weight of about 450 tons, between Paris and Nice or Mentone at an overall speed of 56 m.p.h., the average between Paris and Marseilles being of the order of 60 m.p.h. The operation of normal *rapides* with a weight of 600 *tonnes* was also envisaged. The top speed in normal service is limited to 87 m.p.h. The 680-700 miles in each direction had to be covered without re-fuelling, and a yearly mileage of at least 155,000 was stipulated. In addition to the 80-mile uphill section from Laroche to Blaisy-Bas in the down direction, there are 1 in 125 grades between Marseilles and Nice and also, in the up direction, between Dijon and Blaisy-Bas. The weight per metre run over buffers had not to exceed 7 metric tons nor the maximum axle load 18 metric tons.

Two locomotives were ordered, the first, No. 262-AD-1, having M.A.N.-type engines, and the second, No. 262-BD-1, having Sulzer engines. The first locomotive (actually the last to be delivered) was built by the Cie. de Fives-Lille, and the engines were built under licence by the Soc. Générale de Constructions Mécaniques (S.G.C.M.). The second locomotive was built by the Cie. des Forges et Acieries de la Marine et d'Homécourt, the engines being built by the French Sulzer Company at its St. Denis works. Both locomotives have the 2-Co-2+2-Co-2 wheel arrangement and a maximum axle load of 18 metric tons. Locomotive No. 262-AD-1 has four supercharged engines and main generators and No. 262-BD-1 has two supercharged engines and generators.

As built, the M.A.N.-engined locomotive weighs 224·5 *tonnes* in full working order, and the Sulzer-engined locomotive 228 *tonnes*. These weights are made up as follows:

Locomotive No. Engine	262-AD-1 M.A.N.	262-BD-1 Sulzer
Weights, *tonnes* :		
Mechanical portion	104·5	101·35
Brake gear, complete	6·5	8·1
Diesel engines	26·66	41·2
Main generators	20·84	16·0
Engine-generator underbeds	7·5	4·0
Auxiliary equipment (electric)	4·3	—
,, ,, (electric and engine)	—	9·825
Auxiliary diesel engine sets and driven auxiliaries	7·05	—
Batteries	4·0	3·17
Traction motors, without gears	23·65	24·66
Cables, miscellaneous electric apparatus	6·0	6·35
Fuel oil, main engine	6·85	7·0
,, auxiliary sets	0·75	—
Lubricating oil	1·0	1·44
Water	2·4	3·28
Sand	1·2	0·4
Tools and miscellaneous	1·3	1·225
Totals	224·50	228·000

Both locomotives have spring-suspended motors driving the wheels through individual axle drive, and in the above table the drives are included in the mechanical portion. With the so-called one-hour rating of the engines, the output of the M.A.N.-engined locomotive is 4,460 b.h.p. (including the auxiliary sets) and that of the Sulzer-engined locomotive 4,400 b.h.p., giving respective power-weight ratios of 111 and 115 lb. per b.h.p. It is interesting to compare the weight values under the different headings



Above : Locomotive 262-AD-1 with four supercharged 1,050-b.h.p. M.A.N. main engines and two Saurer auxiliary engine-generator sets

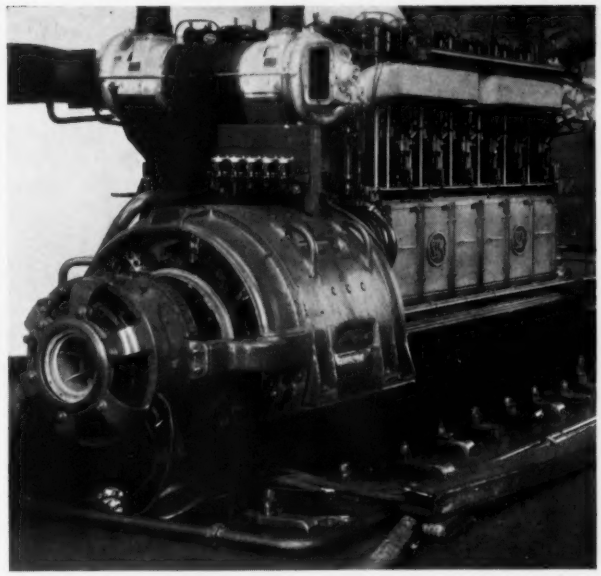
Left : Locomotive 262-BD-1 with two supercharged Sulzer 2,200-b.h.p. engines

and relate them to the designs of the power plants, although there is little difference in the total weights despite the provision of four power plants in one locomotive compared with only two in the other. Although both engines run at 700 r.p.m. at full load, the M.A.N. unit is of a light-weight type, scaling only 14 lb. per b.h.p., whereas the Sulzer engines weigh 20·5 lb. per b.h.p., the weights in each case being without the welded steel underbed. But in the Sulzer-engined locomotive step-up gears are introduced between the engines and generators, and this, combined with the two generators in place of four, nullifies much of the weight gained by the lighter engines. In the Sulzer-engined locomotive the auxiliaries are provided with power by auxiliary generators overhung from the shafts of the two main generators, whereas in the M.A.N.-engined locomotive two separate Saurer engines, each with a maximum capacity of 150 b.h.p. and a normal output of 130 b.h.p., are provided, and operate in conjunction with directly-driven generators.

Engines

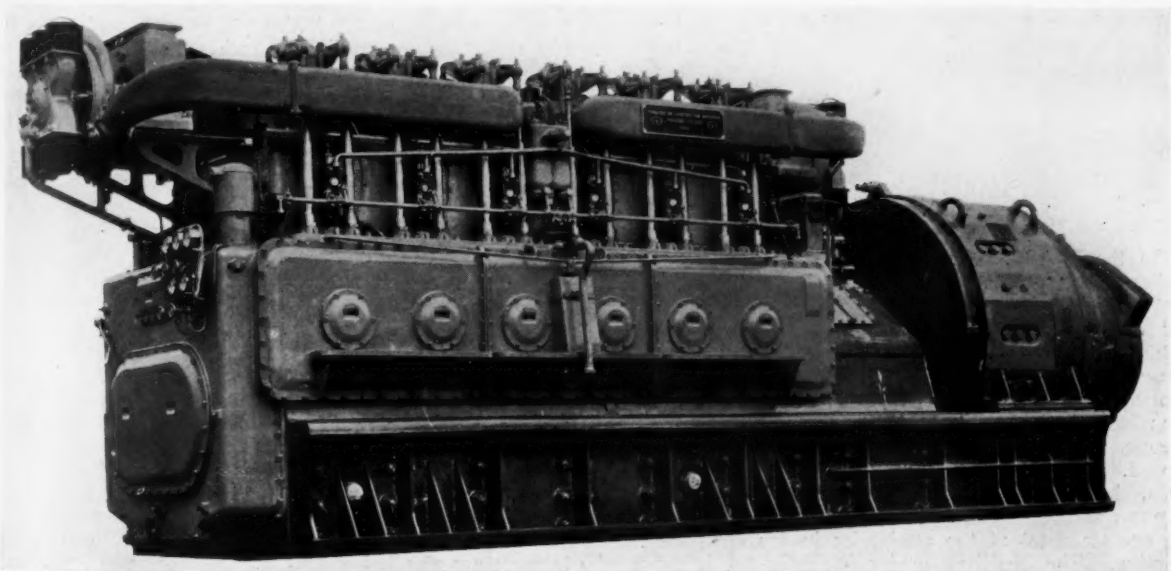
The Sulzer engines have already been fully described in the issue of this Supplement for May 14, 1937, and again (when dealing with Swiss-built engines installed in the Roumanian State Railways' locomotive) in the issue of June 10, 1938. Suffice it, that each engine has two twin and parallel banks of 310 mm. by 390 mm. (12·2 in. by 15·4 in.) cylinders, governed to run at 400, 500, 600, and 700 r.p.m., according to the power requirements. At full load at 700 r.p.m. the output is 2,200 b.h.p., and this has been maintained for over two hours. At a speed of 600 r.p.m. the continuous output is 1,900 b.h.p., and with this rating the test-bed fuel consumption is 167·7 gr. per b.h.p.hr. Rateau exhaust-gas superchargers are fitted.

The M.A.N. engines are of the six-cylinder vertical type, and as may be seen from the locomotive general arrangement drawing reproduced with this article, are set two and two together on a combined bedplate which also carries the two corresponding main generators. The cylinders are 300 mm. by 380 mm. (11·8 in. by 15·0 in.), and the engine is governed to run at 500, 650, and 700 r.p.m. Outputs of 1,050 b.h.p. for one hour and 950 b.h.p. continuously are given at 700 r.p.m. according to the controller setting, and at 500 r.p.m. the output is 500 b.h.p. Rateau exhaust-gas turbo-chargers are fitted to these engines also. The fuel consumption at full load is 171·5 gr. per b.h.p.hr. and at three-quarter load 165 gr. per b.h.p.hr.



M.A.N. twin six-cylinder Rateau-supercharged engines mounted side by side with a generator at each end

The cylinder frame comprises the cylinder block and crankcase, and is cast in one piece of high-tensile steel. Fourteen vertical stays carry the seven bearings of the crankshaft and transmit the load to the frame. These stays are of special steel and are bolted up under tension in order to put the frame under compression. Wet type renewable liners are inserted in the cylinder block. The crankshaft is of exceptionally rigid construction in order to reduce the critical vibrations, and is supported on adjustable bushes. To support half the weight of the generator armature, which has a single bearing, the first



12-cylinder twin-bank Sulzer engine with Rateau supercharger

Driving controls of the twin-unit 4,400-b.h.p. locomotive with Sulzer engines, French National Railways. The instruments on the dashboard are divided into two groups, one for each engine. On the left is the Westinghouse brake handle, then the controller handle and reverser. On the extreme right of the picture is the Flaman speed recorder

engine bearing at the coupling end is bigger than the normal, and it acts also as a longitudinal thrust bearing for the rotating masses. At the generator end the crankshaft carries a forged faceplate which holds the intermediate coupling disc and acts as a hand barring gear. Gearing placed at the opposite end of the shaft drives the lubricating oil pumps. The aluminium alloy pistons carry five pressure and three scraper rings. The cylinder heads are cast individually and house two large-diameter inlet valves, two exhaust valves, and a centrally-placed fuel injector, which sprays the fuel directly into the combustion chamber. The S.G.C.M. injection pumps are provided with means for adjusting the point of injection.

Pressure lubrication is maintained by an Imo gear-driven pump, and is led to the bearings through holes drilled in the shaft and up the centre of the connecting rods. An oil tank is formed in the engine underbed, and from it the used oil is led to a pump and passed thence through the oil-cooling elements on the side of the locomotive. The oil circuits on the two halves of the locomotive are entirely separate. The Rateau exhaust-gas turbo-blowers are placed horizontally at each end of the twin engine sets and assure supercharging. They weigh 130 kg. (286 lb.) each, and absorb 45 b.h.p. at full load while giving an increase of 175 b.h.p. per engine.

Comparative figures for the two makes of engines at the two principal ratings are given below.

	Engine (Four-stroke supercharged)		M.A.N.	Sulzer
A	Output, full load	.. b.h.p.	1,050	2,200
B	Speed, ,,	.. r.p.m.	700	700
C	Weight per b.h.p. at A	.. lb.	14	20·5
D	No. of cylinders	..	6	12
E	Cyl. bore and stroke	.. in.	11·8 × 15·0	12·2 × 15·4
F	Piston speed at B	ft./min.	1,750	1,795
G	Brake m.e.p. at A and B	lb./sq. in.	120	115
H	Output, continuous	.. b.h.p.	950	1,900
J	Speed, ,,	.. r.p.m.	700	700
K	Piston speed at J	ft./min.	1,750	1,540
L	Brake m.e.p. at H and J	lb./sq. in.	108	116
M	Fuel cons. at A and B,	gr./b.h.p.-hr.	?	175
N	,, at H and J	,,	171·5	167·7
P	Lub. oil cons. at A and B	,,	5·0	2·5

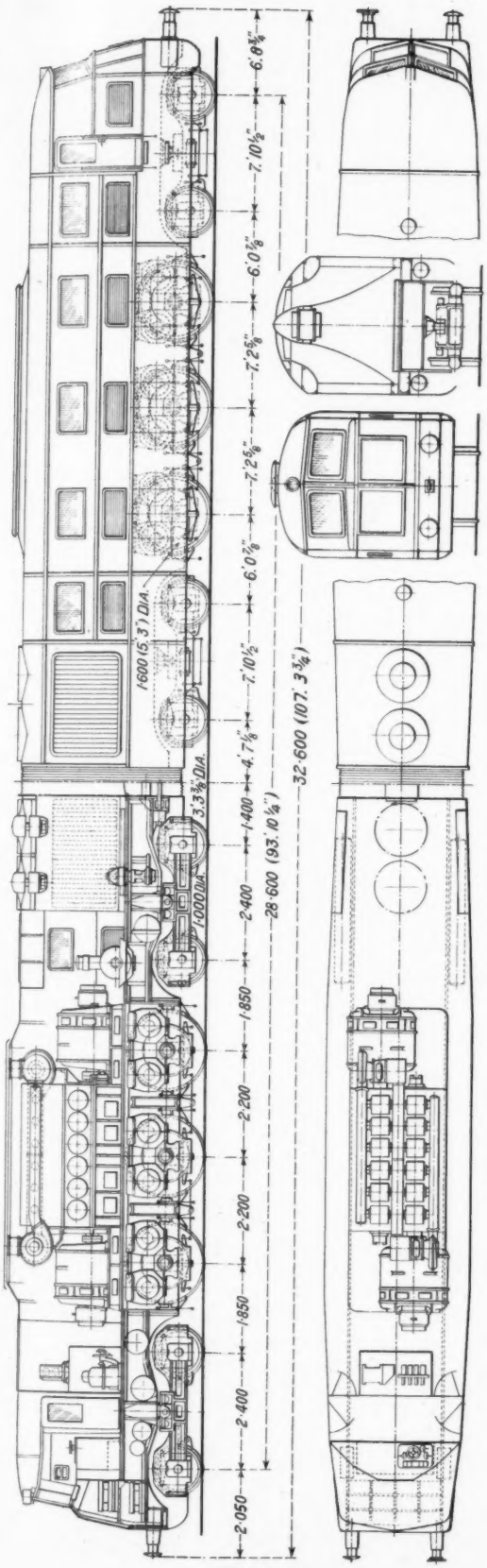
In the M.A.N.-engined locomotive each half unit has a Saurer BXD six-cylinder four-stroke engine coupled to a 105-kW. generator. At 1,500 r.p.m. a maximum output of 160 b.h.p. can be developed in the 134-mm. by 180-mm. (5·3-in. by 7·1-in.) cylinders, but normally the power required for the auxiliaries of each half locomotive will not appreciably exceed 100 b.h.p. The speed therefore has been limited to 1,250 r.p.m. for ordinary requirements, and a top output of 130 b.h.p. is possible at this speed. Should any failure occur in one of the auxiliary sets, the other set can be speeded up to the full 1,500 r.p.m., and the 160 b.h.p. then available will be sufficient to operate most of the auxiliaries in the complete locomotive. The auxiliary engine-generator set is mounted *en bloc* on a welded steel frame, which is mounted on rollers so that it can be easily withdrawn through the side of the locomotive whenever required for maintenance.

Electrical Equipment

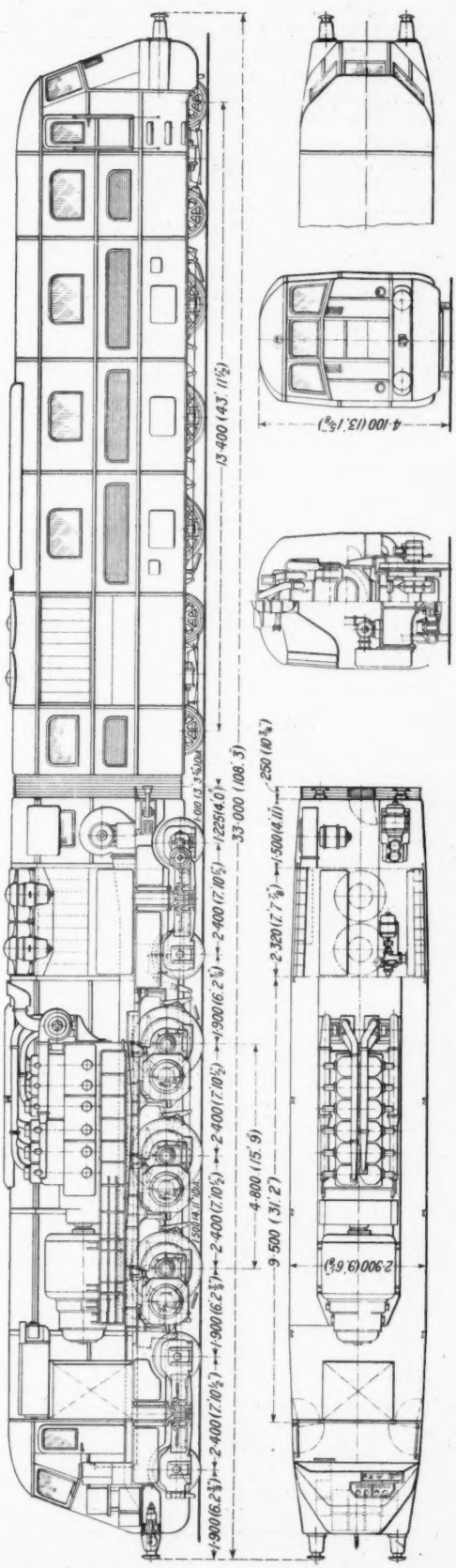
The Jeumont transmission embodied in the Sulzer-engined locomotive, No. 262-BD-1, has three starting and 12 running notches, of which the three starting and the first running notches are available at an engine speed of 400 r.p.m.; notches 2 to 5 at 500 r.p.m.; notches 6 to 10 at 600 r.p.m.; and notches 11 and 12 at 700 r.p.m. The engine power and generator, traction motor and control characteristics allow the maximum starting tractive effort of 46,500 lb. to be maintained up to 25 m.p.h., and at 130 km.p.h. (81 m.p.h.) there is a tractive effort at the wheel rims of 15,450 lb. The tractive effort at the wheel rims on the one-hour rating is 24,200 lb. at 55 m.p.h. and on the continuous rating 16,000 lb. at 70 m.p.h. In full working order the factor of adhesion is 5·1.

The main generator has ten poles, and its armature shaft is driven from the twin crankshafts of the engine by step-up gears with a ratio of 42:35, giving a generator speed of 840 r.p.m. with an engine speed of 700 r.p.m. The one-hour rating is 1,420 kW. at a nominal speed of 835 r.p.m., the voltage being 790 and the current 1,800 amp. On the continuous rating the capacity is 1,220 kW. at 750 r.p.m. (625 r.p.m. engine speed) with 790 volts and 1,545 amp. The auxiliary generator of each set is overhung on a prolongation of the main armature shaft and has a rating of 100 kW. at 750 r.p.m. and 160 volts 625 amp. On the continuous rating the temperature rise of the main generator is limited to 103° C., and on the one-hour rating to 116° C.; the respective efficiencies are 93·3 and 92·9 per cent. Each main generator has three excitation windings, of which one, a series winding, is used only for starting, and is fed by the starting battery. The other two comprise a shunt winding, and a separately-excited winding fed from an exciter driven from one of the axles of the inner carrying bogie.

Each group of three single-armature motors is fed from one generator and the three motors are permanently coupled in parallel, the motor fields being weakened at high speeds. Should one generator fail, it is possible to feed both groups of motors from the remaining generator with current in series, the tractive effort remaining the same but the speed being reduced. Each motor has a one-hour rating of 580 h.p. at 790 volts 600 amp. and 880 r.p.m., corresponding to a track speed of 53 m.p.h., the allowable temperature rise being 120° C. and the motor efficiency, without gears, 92 per cent. On the continuous rating the capacity per motor is 500 h.p. 790 volts 515 amp. at 1,140 r.p.m. (68 m.p.h. track speed), the temperature rise being 120° C. and the motor efficiency 92·4 per cent. without gears. Forced ventilation is used



French National Railways diesel-electric locomotive, No. 262-AD-1, with four M.A.N.-type engines



French National Railways diesel-electric locomotive, No. 262-BD-1, with two Sulzer engines

for the motors, each half locomotive having a 19-h.p. motor-blower group. The Westinghouse-type individual axle drive has gears on each side, the reduction ratio being 37 to 104. The battery is of the cadmium-nickel S.A.F.T. type with a capacity of 398 amp.hr. on the five-hour rate, and has 90 cells. In addition to providing the starting current it provides power for the auxiliaries at a tension of 120 to 150 volts. Normally, it is charged by the two auxiliary generators operating in parallel.

The M.A.N.-engined locomotive, No. 262-AD-1, has four main generators driven directly by the engines at a top speed of 700 r.p.m. The electrical equipment was made at the Givors works of the Cie. de Fives-Lille with the collaboration of the Ateliers de Secheron. The transmission is directly regulated, and automatic controllers of the Simplex-Cuenod type act as servo motors to control the excitation of the main generators. The automatic regulator is connected by a Wheatstone bridge, on one hand to a rheostat controlled by the engine throttle, and on the other hand to a rheostat connected with the accelerator handle of the main control equipment. The control provides 20 notches, of which 1 to 7 are available with an engine speed of 500 r.p.m.; 8 to 16 with 650 r.p.m.; and 17 to 20 with 700 r.p.m. Notches 1 and 2 are used only for starting and any regulation of the excitation is done by hand, as the automatic control does not begin until notch 3 is reached. The main generator driven by each engine is an eight-pole self-ventilated machine with a one-hour rating of 770 kW. 650 volts 1,200 amp. at 700 r.p.m. with a maximum temperature rise of 100° C.; the efficiency under these conditions is 92·7 per cent. On the continuous rating the power is 670 kW. 640 volts 1,050 amp. at 700 r.p.m. with a maximum temperature rise of 90° C.; on this rating the efficiency is 93·3 per cent. Each main machine has its own overhung auxiliary excitation generator with a capacity of 150 volts 120 amp., and in case of a defect, one of these can supply the excitation current for the two main generators on that half of the locomotive.

Secheron-Meyfarth individual axle drive is used to transmit the motor torque to the wheels. Each motor has two armatures and is located above the axle, whereas in the locomotive 262-BD-1 the motors have single armatures and are located like a nose-suspended motor. There are thus six armatures on each half locomotive, and one armature in each motor is fed from one of the two main generators on that half unit. On the one-hour rating each armature has a capacity of 320 h.p. 640 volts 400 amp. at 1,200 r.p.m., corresponding to 51 m.p.h., the maximum temperature rise being 114° C. and the efficiency, without the gears, 92·5 per cent. On the continuous rating the capacity per armature is 280 h.p. 640 volts 350 amp. at 1,260 r.p.m., equal to 53·3 m.p.h., under these conditions the maximum allowable temperature rise is 117° C. and the efficiency, without gears, 93 per cent. The motors are of the six-pole self-ventilated type, and have no field weakening at high speeds. Each half locomotive has a S.A.F.T. cadmium-nickel 90-cell battery of 218 amp.hr. capacity at the five-hour rate of discharge.

Mechanical Portion

In both locomotives each half unit is built up on a chassis of 26 mm. frame plates. The cab structure is built up mainly of steel plates and sections, secured together by a combination of welding and riveting, but certain non-stressed parts are of aluminium alloy plates. The sides and ends of the body are brought down close to the rails, and the whole contour is an approach to a streamlined shape. The driving wheels have overhung laminated springs equalised down each side, giving, in conjunction with the carrying bogies, a four-point suspension for each half of the locomotive. Westinghouse brakes are incorporated, and give a braking force equivalent to 85 per cent. of the weight on the driving wheels plus 70 per cent. that on the carrying wheels. Locomotive 262-AD-1 has outside driving axleboxes of the Bourdon type and No. 262-BD-1 has Athermos boxes. The carrying bogies all have ordinary inside axleboxes. Locomotive 262-AD-1 has carrying bogies of the S.L.M. type with a horizontal centre pivot pin, as used on numerous express electric locomotives of the French National Railways; locomotive 262-BD-1 has an inverted hemispherical centre pivot and laminated lateral control springs, with the addition of a connection between the inner headstock of the bogie and the main frame structure in order to damp out hunting, and which opposes the rotation of the bogie by a force of one *tonne*-metre. The bogie axlebox springs are of the overhung independent laminated type with helical auxiliaries. Just above each carrying bogie, and housed between the main frames, are the fuel tanks, with a capacity of 3,700 litres for each half locomotive.

Notes and News

More American Shunters.—The Grand Trunk Western Railroad has ordered two 89-ton 600-b.h.p. oil-electric shunting locomotives from the Electro-Motive Corporation, for use at the Brush Street terminal station at Detroit.

Brazilian Locomotives.—The Minister of Transport has requested the Minister of Finance to authorise the Bank of Brazil to deposit the sum of £33,400 with the Bank of London & South America Limited, to meet the cost of three diesel locomotives, which, as recorded in our issue of July 9, 1937, are being built by the English Electric Co. Ltd.

D.E.U.A. Anniversary.—The Diesel Engine Users Association, which this month celebrates 25 years of useful existence, held its annual outing on June 16, when a visit was paid to the B.B.C. station at Droitwich. Opportunity was taken for Mr. T. Hornbuckle, Chief Technical Assistant to the Chief Mechanical Engineer, L.M.S.R., to deliver his presidential address on this occasion.

French Railcar for Heavy Grades.—One of the single-unit single-engined 500-b.h.p. Renault diesel cars is to be tried in regular service on the Aurillac–Arvant line in Central France, where the grades are as steep as 1 in 33 for nine miles on end. The summit of the line is 3,400 ft. above sea level. The present stopping steam trains take about three hours for the journey of 66 miles.

Swiss Diesel Orders.—The order for two diesel-electric baggage railcars for trailer haulage placed by the Swiss Federal Railways, as announced in our issue of March 18 last, page 576, has been changed to an order for two locomotives, as sufficient baggage and freight accommodation could not be found on the power vehicle to suit the requirements of the traffic department. Each locomotive will be powered by a Sulzer four-stroke engine fitted with a Büchi supercharger and developing 1,200 b.h.p.

Hungarian Railcars.—Considerable efforts have been made recently to increase the speed of trains in Hungary and to provide convenient connections. With these objects in view there has been an increase in the rapid railcar services. . . . Hungary's reputation in the construction of diesel railcars has been enhanced through the success of one of the large engineering firms [Ganz—ED.] in securing contracts from the Argentine, Belgian, Spanish, Egyptian, and Rhodesian railways.—*Extract from Report on Economic and Commercial Conditions in Hungary, published by the Department of Overseas Trade.*

A Gear-Driven Pressure-Charger

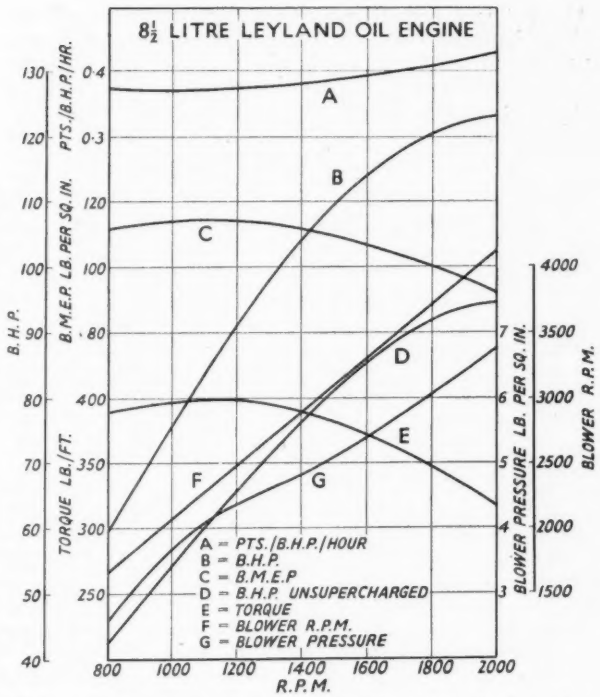
Simple British design applicable to new or existing engines

SUPERCHARGING equipment on three different principles is now available for application to the railway type of oil engine, viz. (*a*) the centrifugal vane type; (*b*) the positive displacement type, as exemplified by the Roots and Centric types; and (*c*) the exhaust gas turbo-charger. In (*a*) and (*b*) the equipment is gear-driven from the engine; (*a*) has a very poor efficiency outside a narrow speed range, and with the Roots blower the pressure in the casing cannot be built up before the exhaust port is opened, and the volumetric efficiency depends largely upon the maintenance of the minimum possible clearance between the rotors and casing.

One type of positive displacement equipment in which some of these objections are eliminated is the Centric supercharger, which incorporates a gear-driven eccentrically-mounted rotor with radial vanes rotating inside a cylindrical housing. With this design a good volumetric efficiency is obtained and the supercharger has a wide range of operating speed over which it gives satisfactory results. It will be realised from the sectional drawing at the bottom of this page that no rubbing contact occurs between the rotating vanes and the outer casing, and actually it has been found possible to maintain a clearance of 0·003 in. The vanes being attached rigidly to housings with ball bearings round the driving shaft, the original clearance can be maintained, and therefore there should be no drop in the volumetric efficiency after a period of operation. Each vane is mounted on two ball bearings.

The vanes themselves pass through slots machined in the rotor, and as the vane shaft is eccentric to the rotor, some means has to be provided to allow of the angular movement of the vanes where they pass through the rotor. This is done by oscillating trunnions of hard-wearing fabroil material located in the wall of the rotor, and the only rubbing contact in the Centric supercharger is where the high-tensile steel vanes pass through the trunnions. Automatic lubrication is ensured by a Best & Lloyd type of oil pump driven through a reduction gear on the tail end of the central shaft.

Without any change in principle, there are two types of Centric supercharger built, the first, known as type A, being provided with a driving shaft which extends through only one end of the blower casing, and drives the rotor

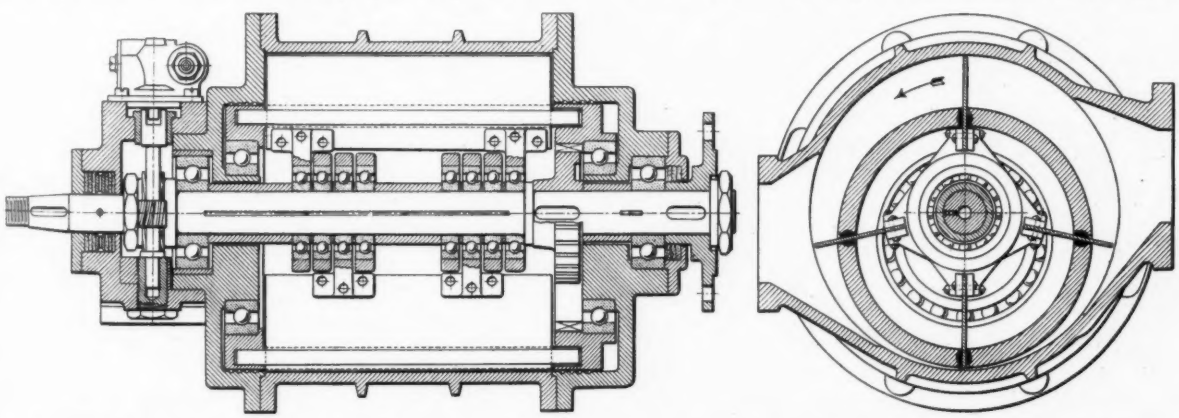


Characteristic curves of a Leyland oil engine fitted with a Centric gear-driven supercharger

directly by means of the cover plate, which is integral with the driving shaft. The second pattern, as illustrated on this page, has a driving shaft which is extended through both ends of the casing, so that auxiliaries can be mounted in the same line. In this case the drive to the rotor is taken through a spur pinion on the central driving shaft which engages with an internal toothed pinion on the rotor. With this construction the rotor turns at a slower speed than the centre shaft, the ratio being about 1 : 0·66.

As a rule, the casing and end plates are of aluminium or Elektron, and the rotor is of Hiduminium R.R.56, or of a special heat-treated aluminium alloy. For the vanes a nickel-chrome air hardening steel is used, and the vane carriers are of 38-ton manganese bronze; the centre shaft and rotor drive plate are of chrome-molybdenum steel.

Vee belts, chains, or gears can be used for the drive.



A type G Centric supercharger driven through internal-tooth gearing. It will be noticed that the four vanes are radial to the casing, and that it is the rotor which is eccentric to the casing

At what is a normal supercharging pressure for railway oil engines, 5 lb. per sq. in., a type 640/G supercharger running at 2,000 r.p.m. absorbs about 5¾ h.p. net and delivers nearly 150 cu. ft. of air a minute. Its net weight is under 60 lb. Air at pressures up to 20 lb. can be delivered, but over the ordinary working range of railcar oil engines nothing like this is required, and a very appreciable gain in output can be obtained with less than a third of that pressure. The accompanying curves obtained on test with a Leyland oil engine show that with an engine speed of 1,800 r.p.m. and a supercharging pressure of 6 lb. per sq. in., the increment in output was 50 per cent. In this case the blower speed was just over twice the engine speed.

LETTER TO THE EDITOR

Railcar Transmissions

Budapest, June 18

TO THE EDITOR, *Diesel Railway Traction Supplement*

SIR,—Advertisements appeared in the February 18, April 15, and June 10, *Diesel Traction Supplements* drawing attention to the production of fluid transmissions for diesel railway traction in recent years. As the fluid transmission proportion for 1937 was given as 59·4 per cent., conveying the impression that the remaining 40·6 per cent. covered the mechanical and other transmissions, I have subjected the data to a close investigation.

This investigation shows that the figures are misleading in the extreme, and that they must have conveyed to most readers the entirely erroneous impression that hydraulic transmissions are rapidly superseding mechanical transmissions throughout the world. The fact is, that for use outside the State Railway in present-day Germany, in which country the torque converter was developed, the annual production of that type of transmission is really insignificant and shows no appreciable upward trend.

The advertisements create a wrong impression for two reasons. In the first place they confuse the issue by summing together two fundamentally different classes of hydraulic mechanism each with an entirely different purpose, *i.e.*, the converter and the coupling. The converter is the true counterpart of the mechanical gearbox, but the coupling is only a clutch with the same functions as a friction clutch, and, like a friction clutch, is only a unit of a mechanical transmission. Hence, only the hydraulic converter can be logically designated a hydraulic transmission, and the distinction is particularly important when a comparison between the basic types of transmission is in question. When, in accordance with this distinction, the hydraulic couplings are transferred from the classification of hydraulic transmission to that of mechanical transmission, of which they are a subdivision, the relative figures for these main groups for 1937 show a very different picture.

In the second place the advertisements do not bring to light the significant fact that, as indicated in Messrs. Voith's publication No. 1042, out of the total of 399 hydraulic transmissions—to use that term in the sense indicated in the preceding paragraph—333 are in two countries (Germany with the great majority and Austria with a few), and only 66 throughout the rest of the world. As is well known, technical development in Germany is not in these times regulated entirely by technical excellence, and railway managements in other countries must be guided by economic considerations, so that German policy is not necessarily a sound precedent for others to follow. The remaining 66 transmissions are an insignificant proportion of the total vehicles in the world outside Germany and Austria, and the component annual totals of 5, 22, 13, 11, and 15 for the last five years in chronological order, do not show any steady increase.

The exact proportion of hydraulic transmissions among the vehicles supplied and ordered in 1937 outside Germany cannot be stated without knowing the German proportion of the total world construction of 800 given in the advertisement, but as the German contribution can hardly have reached one-half of the total, the proportion of hydraulic transmissions outside Germany must be less than 15:400 or 4 per cent., a very different state of affairs from that which might well be inferred from studying the advertisements without appreciating the other circumstances to which I refer.

Although these numbers of Voith system hydraulic transmissions represent most of the world production of this class of drive for railways, it is interesting to note that Ganz & Co., only one of a large number of railway mechanical transmission builders, have supplied 331 mechanical transmissions to railways other than those of their own country, the last four annual totals being 41, 16, 110, and 164 in chronological order, which shows indeed a steady increase. The capacities ranged up to 375 b.h.p.

In conclusion, I should like to refer to a question to which I have not yet been able to elicit a reply, viz., where and in what numbers are hydraulic torque converter transmissions to be found in genuine passenger railcars with engine units of not less than 250 b.h.p., and which have covered at least 100,000 km. in service? That service limit is the minimum which would interest a railway engineer as evidence of reliability and the horsepower limit is that above which the converter size becomes unduly large unless resort is had to the complication of multiplying gearing.

Yours faithfully,

V. LEHEL

BÜCHI SUPERCHARGERS.—Among the orders recently received by the Büchi Syndicate for exhaust-gas turbochargers are 16 sets for application to 220-b.h.p. Brescia-Saurer engines being installed in railcars for the Italian State Railways, and 10 for 425-b.h.p. Simmering vee engines to be used in fast railcars on the erstwhile Austrian Federal Railways.

HUDSWELL LOCOMOTIVES.—Among the diesel locomotives now being built by Hudswell, Clarke & Co. Ltd. are two of 150 b.h.p. for the Air Ministry and one of the same power for Shell-Mex. The two Air Ministry locomotives have Traction gearboxes and Telechange control as developed by the Hydraulic Coupling & Engineering Co. Ltd.

RECENT HUNSLET ORDERS.—Diesel locomotives ordered from the Hunslet Engine Co. Ltd. during the past few weeks include a 165-b.h.p. diesel-mechanical unit for the Paita-Piura Railway and an 82-b.h.p. unit for the Chimbote Railway; both of these lines belong to the Peruvian Corporation. A 30-b.h.p. shunting tractor has also been ordered by the Crown Agents for service in Ceylon.

ULTRA-VIOLET RAY LAMPS.—To obviate reflection from instrument lights preventing the clear vision of signals by drivers of railcars, the French National Railways is experimenting with special lamps emitting ultra-violet rays invisible to the human eye. The figures and needles of the dials and instruments are covered by a fluorescent substance which converts the dark rays falling on the dial to visible rays.